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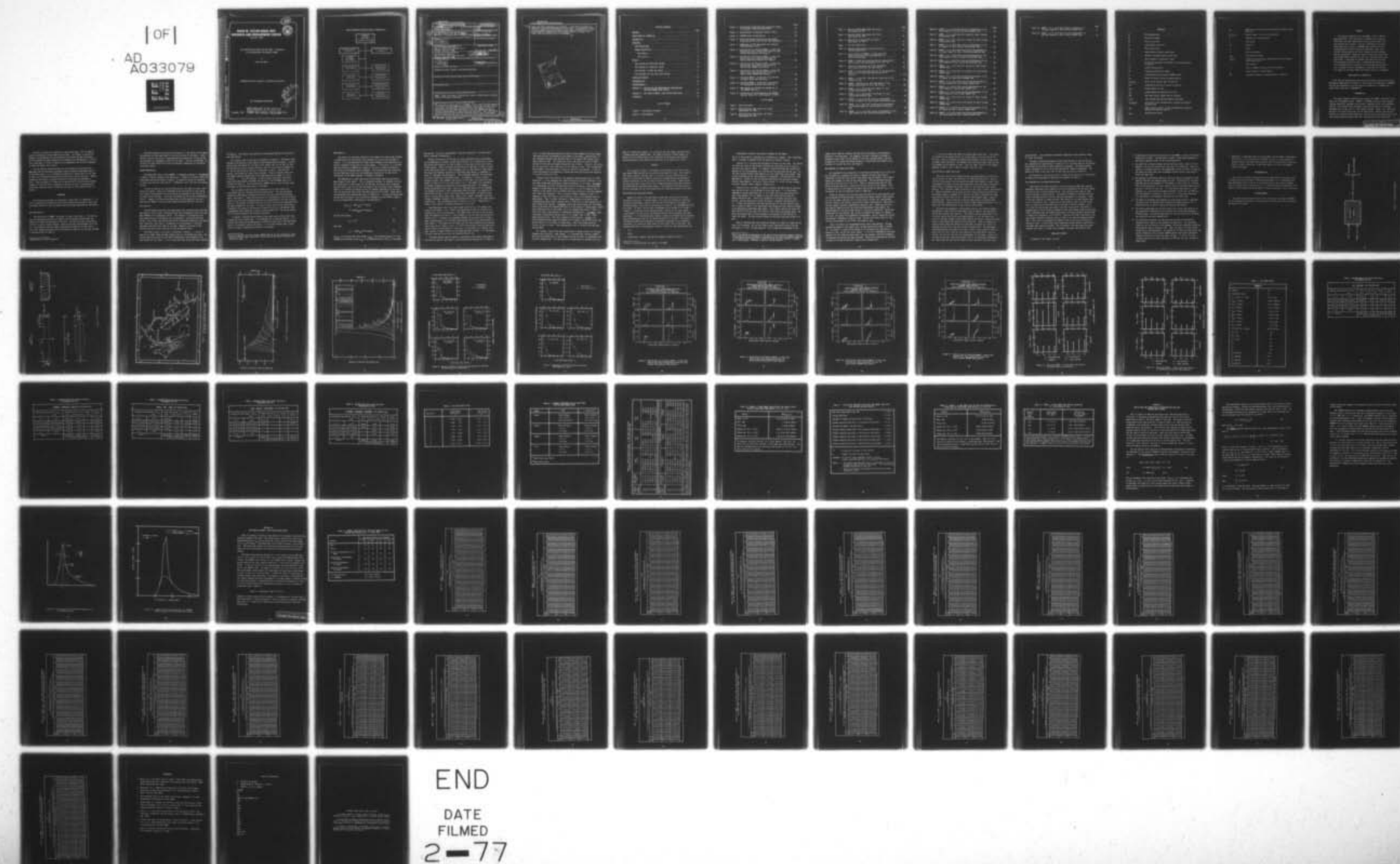

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DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER

Bethesda, Md. 20084

SHIP MOTION PREDICTIONS FOR THE MONOB I, OPERATING IN THE WATERS NEAR THE BAHAMA ISLANDS

by

Susan Lee Bales

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SHIP PERFORMANCE DEPARTMENT

September 1976 SPD-727-01

SHIP MOTION PREDICTIONS FOR THE MONOB I, OPERATING IN THE WATERS NEAR THE BAHAMA ISLANDS

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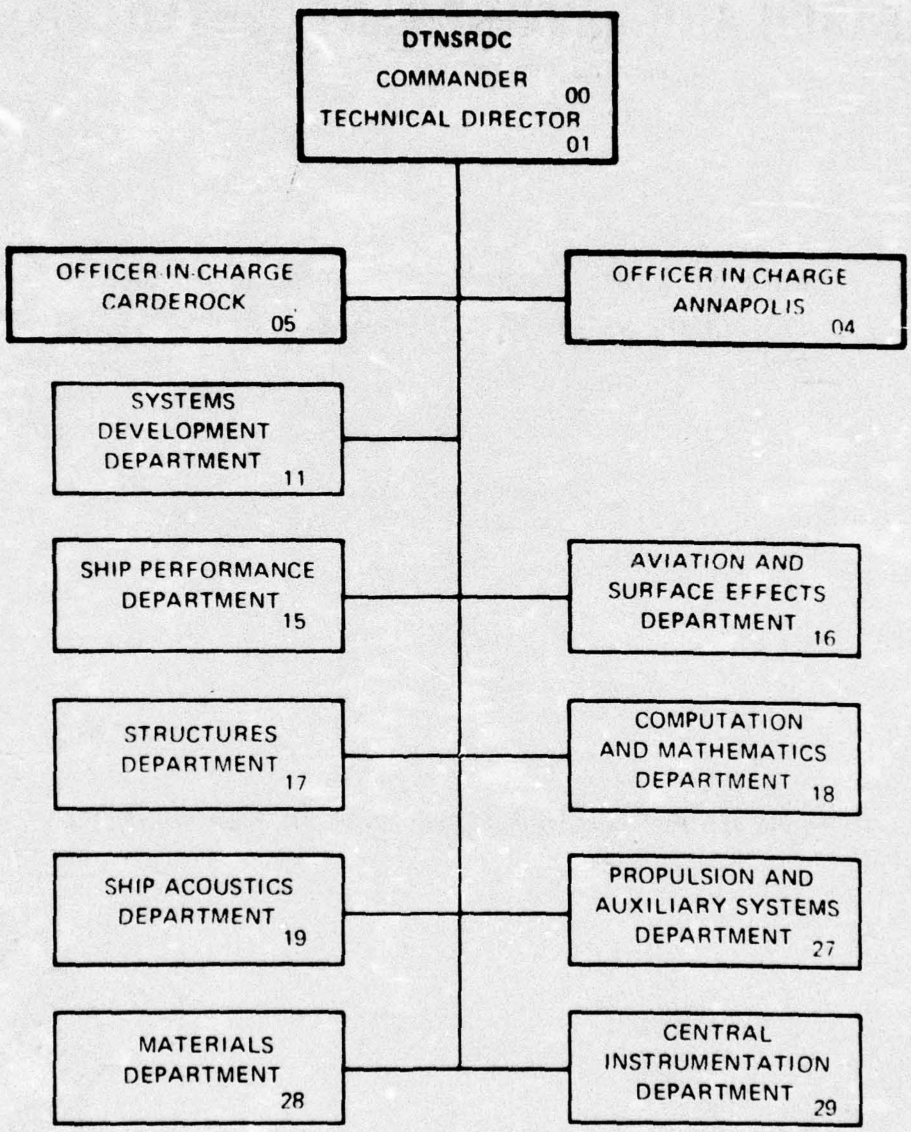

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Ship motion predictions for the MONOB I 57.62 m (189 ft) barge operating in the waters near the Bahamas are presented. The motions and their associated periods are calculated using Bretschneider wave spectra, which are representative of open ocean conditions, as well as JONSWAP wave spectra, which are representative of fetch-limited sea conditions. Both long crested (unidirectional) and short crested (multidirectional) seas are considered. Based on historical wave data, worst case and representative case motion

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NOTATION

AP	Aft perpendicular
B_X	Maximum ship beam
CG	Center of gravity
CL	Longitudinal centerline
C_B	Block coefficient
C_P	Longitudinal prismatic coefficient
C_X	Maximum transverse section coefficient
f	Wave frequency, cycles/sec or herz
f_o	Period corresponding to the peak of the wave spectrum, cycles/sec
FP	Forward perpendicular
GM	Transverse metacentric height
g	Acceleration due to gravity, 9.8087 m/sec^2
KG	Height of center of gravity above baseline
K_ϕ, K_θ, K_ψ	Roll, pitch, and yaw radii of gyration
LCG	Longitudinal position of center of gravity
L_{OA}	Length overall of ship
L_{PP}	Length between perpendiculars of ship
RMS	Root mean square, square root of variance
$S_\zeta(\omega)$	Long crested wave spectral density ordinates
$T_{AP}, T_{\otimes}, T_{FP}$	Ship draft at aft perpendicular, midships and forward perpendicular
T_{OE}	Modal response period, period corresponding to peak of encountered response spectrum
T_{obs}	Observed wave period

T_o	Modal wave period, period corresponding to peak of wave spectrum
T_Z, T_ϕ, T_θ	Natural heave, roll, and pitch periods
$\overline{T}$	Average zero crossing period
U	Wind speed
WL	Waterline
X	Fetch
Δ	Ship displacement
ζ_{obs}	Observed wave height
$(\tilde{\zeta}_w)_{1/3}$	Significant wave height, average of one third highest double amplitudes
μ	Ship heading
σ	RMS or standard derivation of ship response
ω	Wave frequency, radians/second
$\otimes$	Midlength between ship perpendiculars, midships

ABSTRACT

Ship motion predictions for the MONOB I 57.62 m (189 ft) barge operating in the waters near the Bahamas are presented. The motions and their associated periods are calculated using Bretschneider wave spectra, which are representative of open ocean conditions, as well as JONSWAP wave spectra, which are representative of fetch-limited sea conditions. Both long crested (unidirectional) and short crested (multidirectional) seas are considered. Based on historical wave data, worst case and representative case motion levels for winter operations are identified. A data base of seasonal sea conditions, derived from published historical data, is presented and consists of joint probabilities of occurrence of wave height and periods as well as probabilities of exceedance of specified wave heights for Tongue of the Ocean (TOTO) near Andros Island in the Bahamas.

ADMINISTRATIVE INFORMATION

This work was conducted by the Surface Ship Dynamics Branch of the Ship Performance Department at the David W. Taylor Naval Ship R&D Center (DTNSRDC). The work was requested by the Ship Acoustics Department of DTNSRDC and is identified as Work Unit 1-1965-008-10.

INTRODUCTION

This report presents predicted ship motions for MONOB I operating in the waters off the Bahama Islands. MONOB is a DTNSRDC controller, Navy manned, floating acoustical laboratory which usually operates out of Fort Lauderdale, Florida. Ship motions were calculated using state-of-the-art techniques developed by U.S. Navy and U.S. Coast Guard programs. Heave, roll, and pitch motions at the ship's CG as well as the longitudinal, lateral, and vertical motions at a specified cable sheave are reported for the ship operating in both long crested (unidirectional) and short crested (multidirectional) seas.

The ship is taken to be operating in the hove-to mode. This is modeled simply by assuming a forward speed of zero knots. No attempt to analyze the effects of stationkeeping on the predicted ship motions has been undertaken. The ship heading has been allowed to vary between 0 and 180 degrees, or following to head seas, in order to identify the predominant wave direction expected to cause the highest ship motions.

The ship motions reported herein are to be used by the Ship Acoustics Department and the Hydrospace Challenger Group of EG and G Washington Analytical Services Center, Inc. to evaluate the design of a cable which will be used to lower an instrumentation capsule into and raise it out of the water. Before presenting the results, a general overview of the prediction procedure is given. Special emphasis is placed on the description of the marine environment (seaway) in which the ship is expected to operate, as this is considered the single most important factor influencing the results, once the ship itself is defined.

PROCEDURE

The calculation procedure is explained in great detail in Reference 1.* In brief, a description of both the ship and the seaway are required as input, and the output consists of the ship motions and their associated periods, see Figure 1.

SHIP PARTICULARS

The particulars of MONOB I are given in Figure 2 and Table 1. The particulars were developed from data provided by the Ship Acoustics Department and reflect the latest modifications to the ship. The ship originally was 51.83 m (174 ft) in overall length; however, recently the stern was extended 4.57 m (15 ft). The extension does not affect the underwater shape of the ship used in this work, though the loading of the ship does vary and as such has been included in the particulars of Table 1.

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*References are listed on page 73.

The point denoted by the asterisks on Figure 2 is the center of the sheave which houses the cable described in a previous section of the report. Longitudinal, lateral, and vertical displacements were computed for this point and are presented in a subsequent section of the report. Vertical displacement at the point has been identified by the Ship Acoustics Department as the motion of primary concern.

SEAWAY DESCRIPTION

The operational area in which MONOB I is expected to operate in the Bahamas is shown in Figure 3, adopted from Reference 2. Tongue of the Ocean (TOTO) and Exuma Sound are the two areas of concern. An extensive search was conducted to locate wave data for these regions. References 2 and 3 are the only sources located.

In order to perform the required calculations, two types of seaway information are needed. These are a knowledge of the distribution of wave energy with respect to wavelength or wave period and a knowledge of the severity of the seas of the two areas. The latter requirement was satisfied by References 2 and 3. However, the former requirement has not been completely met as no wave spectra appear to have ever been measured and published for the area.

Wave Spectra

The ship motion predictions have been done using two analytically derived wave spectral forms, namely the Bretschneider (B) two-parameter family and the mean JONSWAP (J) five-parameter family. The B-family is representative of open ocean data and is defined by the two parameters, wave height and wave period. The J-family was derived from fetch-limited data measured in the North Sea. Nominally, the J-family is dependent on five parameters, including parameters describing the shape of its peak. Appendix A provides a more detailed description and comparison of the two spectral forms.

The B-family used in this work is presented in Figure 4. In brief, 8 spectra with modal (peak) periods ranging from 3 to 10 seconds were used. The period range was derived from the data of Reference 3 and presented in the next section of this report. A unit significant wave height was used to define

the spectra. This permits the scaling of the predicted motions to any significant wave height.

The J-family used in this work is presented in Figure 5. The spectra were defined by considering a wide range of fetch lengths and wind speeds. In brief, spectra were calculated for the seven fetch lengths (20, 35, 40, 45, 70, 100, and 120 nautical miles) shown on Figure 3, and five occurring wind speeds (10, 14, 18, 22, and 26 knots) reported in References 2 and 3. From these 35 spectra, the 8 shown on Figure 5 were selected. These 8 represent those with the highest spectral energy peak within each modal period range, 3.5 to 4, 4 to 4.5, . . . , 8 to 8.5 seconds. A table listing the fetch, wind speed, significant wave height, and modal wave period of the 8 JONSWAP spectra is included on Figure 5. The so-called mean JONSWAP spectral form has been used. No attempt to describe water depth is included.

The two spectral families were considered both as long crested (unidirectional) and ship crested (multidirectional) seas. This was considered necessary as Reference 2 indicates that swell can enter both TOTO and Exuma Sound, see Figure 3. Swells are conservatively represented by the long crested spectra, and the local wind-generated seas are represented by the short crested spectra.* No attempt to combine the two into swell corrupted wind generated seas has been attempted in this work. The short crested spectra were determined by "spreading" the energy of the spectra of Figures 4 and 5 to $\pm$ 90 degrees about a predominant wave direction by using a cosine squared law. The cosine squared law is the best spreading law currently available.

In summary, two wave spectra families have been used to define both long crested and short crested seas. In the absence of any measured spectra, it is assumed that these are representative of conditions occurring in TOTO and Exuma Sound. By using this variety of spectra, it is further assumed that a representative range of expected ship motions is predicted.

*Strictly speaking, the long crested JONSWAP spectra are not necessarily representative of swell due to the fetch limits used and are better considered as wind driven seas.

Wave Severity

The severity of the seas, especially with regard to a given ocean platform, is determined by the wave height, the wavelength or period, and the wave direction. It is the combination of these three parameters which determines the overall response of given ship to a given seaway. In this work, it is assumed that the direction of MONOB with respect to the sea is random and hence all directions are considered equally probable. Ship motions have been predicted for ship headings relative to the predominant direction of the sea from 0 (following) to 180 (head) degrees in 15-degree increments.

The combination or joint occurrence of wave height and wave period has been treated in more detail. This is necessary because, for example, the ship may respond more to lower waves of a period near its natural pitch frequency than to higher waves of a period some seconds from its natural pitch frequency. Tables 2 to 6 present the annual as well as seasonal observed joint distributions of significant wave height and modal wave period for TOTO. These tables were developed from observations given in Reference 3. The observed heights and periods were converted to the two defining parameters of the B-family spectra by use of Nordenström's relationships, see Reference 4,

$$(\tilde{\zeta}_w)_{1/3} = 1.68(\ _{obs})^{0.75} \text{ metres}$$

$$\overline{T} = 0.82(T_{obs})^{0.96} \text{ seconds} \tag{1}$$

and the relationship

$$T_o = 1.4\,\overline{T} \tag{2}$$

such that

$$T_o = 1.148(T_{obs})^{0.96} \text{ seconds} \tag{3}$$

$(\tilde{\zeta}_w)_{1/3}$ is the significant wave height, ζ_{obs} is the observed height, $\overline{T}$ is the average zero crossing period, T_{obs} is the observed period, and T_o is the modal

wave period. The use of Nordenström's relations, equations 1, has been previously discussed in Reference 5.

Though, the severity of the sea on a given platform should be considered by the combination of height, period, and direction, it is tranditional in both ship design and operation to refer primarily to the state of the sea in terms of wave height. Table 7 presents the definition of sea state in terms of significant wave height which is used throughout the U.S. Navy and U.S. Coast Guard. The annual and seasonal variation of significant wave height is presented in Figure 6, developed from Reference 2. The histograms represent the occurrence of a given significant wave height range. For example, in winter (January, February, March), most commonly (70 percent of the time), the significant wave height is from 0.7 to 1.6 m or Sea States 2 to 3. The dashed line represents the percent frequency of exceeding a given significant wave. For example, in winter, 50 percent of the time, 1.25 m or a high Sea State 2 will be exceeded. The seasonal variation is easily determined from the figure. For example, 50 percent of the time in winter, the significant wave height will exceed 1.25 m while in spring (April, May, June), summer (July, August, September), and fall (October, November, December), the corresponding statistic is 1.10, 0.85, 0.92 m, respectively. The corresponding annual statistic is 1.20 m. Regardless of season, a Sea State 2 is exceeded 50 percent of the time.

Both References 2 and 3 give wave height distributions, for example see Figure 6 and Tables 2 to 6. Figure 7 was developed in order to establish the compatibility of the two data sets. The dashed lines on Figure 7 are the same ones that appeared on Figure 6. The triangles (Δ) are derived from the data of Tables 2 to 6. In general, the agreement between the two data sets is rather good, though Tables 2 to 6 represent approximately half as many observations as does Figure 6. The comparison for summer and fall shows somewhat more disparity than either the all season, winter, or spring distributions, possibly due to the smaller number of observations in each case. As the Figure 6, or dashed line, data permits a higher probability of exceeding higher heights, it is considered the more conservative and thus the preferred data to use.

The modal periods used to construct the B-family wave spectra described in the previous section, see Figure 4, were selected upon examination of Tables 2

to 6. It would have been desirable to have a finer breakdown of period ranges than that derived from Reference 3 and shown on the tables. Nevertheless, it was considered possible that periods from 3 to 10 seconds in 1-second increments should be used. This range also covers that which the possible combinations of fetch and wind speed dictated for the J-family. Annually, and during all but the winter, most waves occur at 5.4 seconds or less. The corresponding most probably occurring waves in winter are at 6.6 to 9.5 seconds. In spring, a few rare waves are 9.5 seconds or greater and have significant wave height of 1.2 to 2.6 m (3.8 to 8.7 ft).

Figures 6 and 7 and Tables 2 to 6 represent observed conditions for TOTO. Generally, it is not expected that conditions would be totally different in the two areas though some differences, based on Reference 2, are noted. In winter, if a representative wind of 16 knots persists for six hours, significant wave heights in Exuma Sound may be from 0.30 to 0.61 m (1 to 2 ft) greater than in TOTO due to the greater fetch available along the direction of the most probable winds (east and northeast). Also in winter a higher frequency of swell is expected in TOTO, see Figure 3, and relatively little in the southern part of Exuma Sound. Thus, in winter the waves in Exuma Sound will be mainly local wind-generated waves (short crested) while in TOTO there is high probability of swell waves (long crested). In spring, significant wave heights for the higher winds ($\geq$ 18 knots) can produce waves 0.61 m (2 ft) greater in Exuma Sound, though swell should be rare in both areas, occurring somewhat more often in TOTO. A wind of 12 knots, from the east is considered representative. In summer, local wind waves in Exuma Sound may be 0.30 m (1 ft) higher than in TOTO. Swell waves should be rare. The wind is generally from the east. In fall, the locally generated wind waves are highest of all seasons, see Tables 2 to 6, and may be 0.46 m (1.5 ft) larger in Exuma Sound. Swell occurrences would be similar to that in winter. The representative wind is 16 knots from the east and northeast.

As a summary, Table 8 has been prepared and is based primarily on the most probably occurring wind in each season. It is assumed that the most probably occurring wave height and its most probable period can occur simultaneously with the most probable wind. The wave periods in Exuma Sound are assumed to be the

same as in TOTO here, however, it is possible that the longer available fetch in Exuma Sound may lengthen them. The range of periods in each category on Tables 2 to 6 is rather wide, so any variation of the percent occurrence at Exuma Sound would likely change the complexion of the tables very little.

RESULTS

As indicated in Figure 1, the results are presented in the form of root mean square (RMS) motions and the periods associated with them. The system of ship motion computer programs used in this work can also provide hard copy output of the ship motion spectra, from which the RMS motions and associated periods are derived, as well as time histories of ship motion. These options were not exercised in the current work, though the spectra have been stored on microfiche and are available upon request. The calculation of time histories was not undertaken and was considered beyond the scope and funding of the work.

RMS MOTIONS AND ASSOCIATED PERIODS

Appendix B presents the data base of predicted ship motions of primary interest to this work. These are heave, roll, and pitch motions at the ship's CG and the longitudinal, lateral, and vertical displacement at the center of the cable sheave, identified by the asterisk in Figure 2, for the MONOB operating at 0 knots. Of these, the vertical displacement at the sheave is of primary interest. In addition to the required motions, motions at two other speeds, 3 and 6 knots,* as well as the corresponding velocities and accelerations were calculated. It is considered rather useful to have such information for possible future evaluations as well as for general operation of the ship. The cost of including the additional responses is essentially absorbed in extra computer time which is a relatively small amount of the overall cost of the work. The complete data base of displacements (angles), velocities, and accelerations for

roll

pitch

longitudinal, lateral, and vertical (heave) response at the CG

*6 knots is considered near top speed of the MONOB.

longitudinal, lateral, and vertical response at the sheave for 0, 3, and 6 knots is available on microfiche upon request. The 3 and 6-knot data is included in Appendix B for the motions of primary interest.

Figures 8 to 11 provide the data base of interest to this work. The figures are "density" plots of the motions predicted for the 0-knot case for each of the four wave spectral forms. For example, Figure 8 provides the required six motions for all ship headings as a function of the associated period, T_{0E},* for the long crested B-family wave spectra at a unit significant wave height. Each of the six graphs on the figure contain (13 headings) · (8 wave spectra) = 104 data points. Figure 9 is for the motions predicted using the short crested B-family wave spectra. Similarly, Figures 10 and 11 are for the long crested and short crested J-family spectra, respectively.

Figures 8 to 11 are useful in determining both the amplitudes of the worst case motions as well as the periods at which they occur. It is considered reasonable, though conservative as it is unlikely the worst case motions will occur simultaneously for all modes, to use these worst motion values for design evaluation work. Table 9 was prepared to illustrate the worst case motions, and the conditions at which they occur, selected from Figures 8 to 11. It should be noted here that the values given for the two B-family types are in terms of 0.30 m (1 ft) significant wave height and thus should be scaled to an appropriate significant wave height. The J-family motions are given for both the 4.0 m (13.1 ft) and 2.6 m (8.5 ft) significant wave height cases. The lower wave height case will be discussed in the section on Ship Motions in Lower Sea States. The next section focuses on the worst case wave height (4 m) only.

Table 9 indicates that the motions are highest for spectra of modal periods from 7 to 10 seconds. All of the J-family worst case motions occur with the 8.4-second, 4 m (13.1 ft) wave spectrum. This J-spectrum corresponds to the

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*T_{0E} is the period corresponding to the peak of the encountered response spectrum. It has been found to correspond to the period of the cycle of greatest excursion in ship motion time histories for conditions when the wave spectrum is reasonably single-peaked. Reference 1 contains further details.

longest fetch (120 nm), highest wind (26 knots) considered, and represents a relatively rare occurrence. For example, in winter a 26-knot wind speed is expected to occur from 7 to 15 percent of the time, see Reference 2, but may be generally of limited persistence because 4 m significant wave heights occur 2 percent or less of the time, see Figure 6.

SHIP MOTIONS IN HIGHER SEA STATES

For purposes of this evaluation, a significant wave height of 4 m (13.1 ft) will be taken as a standard with which to compare the worst case motions identified in the first four rows of each motion type of Table 9. The J-family results are already in terms of this wave height. The Bretschneider motions should be multiplied by 4 m (13.1 ft). Table 3 indicates that waves of this height have been observed in winter with periods of 6.6 to 9.5 seconds. This is approximately in the range of the worst case periods of Table 9, e.g., 7 to 10 seconds, so that the selection seems a viable one.

Figure 12 presents the resulting worse case motions for each spectral type. The percentage difference between the highest and lowest values of each motion are 15.1 for heave, 28.9 for roll, 5.0 for pitch, and 28.1 for longitudinal, 25.6 for lateral, and 19.8 for the vertical sheave displacements. RMS pitch is the only motion relatively unaffected by spectral type. Examining the first four rows of Table 9 for all but pitch and longitudinal displacement, the heading angle for the worst case motions is relatively unaffected. The period associated with the motions, T_{0E}, varies 3.5 seconds for heave, 2.2 seconds for pitch, 0.5 second for longitudinal displacement, and 0.2 second for lateral displacement, depending on spectral type. The period of worst case roll and vertical displacement do not change with spectral type.

Table 10 presents the recommended overall worst case motions. The RMS motions correspond to the highest ones, of each motion-type, shown in Figure 12. The results in Table 10 correspond to an infrequent wave occurrence, 2 percent or less, during the winter season. In lieu of a knowledge of true wave spectral form for TOTO and Exuma Sound, the wave spectral type which produces the highest ship motions has been selected. Those which correspond to the data of Table 10 include all but the J-family short crested form.

It should be noted that Table 10 presents RMS motions only. This value corresponds to the square root of the zeroth moment or area of the motion spectrum. Table 11 provides the appropriate constants to scale these values to higher order statistics. For example, the significant worst case vertical displacement at the sheave is 2.00 · 1.95 m or 3.90 m (12.8 ft), the highest expected in 100 is 3.03 · 1.95 m or 5.90 m (19.4 ft), etc.

SHIP MOTIONS IN LOWER SEA STATES

The worst case results presented above are representative of relatively rare (2 percent or less) sea conditions for TOTO and Exuma Sound. Table 8 indicates that perhaps more representative conditions, based on a most likely wind speed of 16 knots, and the same predominant direction (east, northeast) would result in somewhat lower waves (2.6 m or less) and thus less severe motions. This wind occurs about 16 percent of the time in winter, see Reference 2. Figure 6 indicates that 6 percent of the time in winter the significant wave height equals or exceeds 2.6 m (8.5 ft) and Table 3 indicates the modal wave period is more likely to be in the 6.6 to 9.5-second range. Figure 5 indicates that J-family spectra 4-3 and 5-4 come closest to meeting these specifications. Spectrum 5-4 has a slightly higher height and period, so it is chosen for this determination of more typical ship motions.

Following the procedure in the previous section, the J-family motions, identified in rows 5 and 6 of each motion type of Table 9, are identified for the more typical sea condition. The B-family motions identified in the first two rows of Table 9 are considered appropriate for this case also. Figure 13 has been prepared using these J-family and B-family motions of Table 9 with a significant wave height of 2.6 m (8.5 ft). Table 12 presents the highest motion values for each motion-type shown on Figure 13. Table 12 includes motions for all but the two short crested forms. The percentage difference between the highest and lowest values for each motion is 18.0 for heave, 44.2 for roll, 10.4 for pitch, and 34.2 for longitudinal, 52.6 for lateral, and 17.6 for the vertical displacements of the sheave. Except for the case of vertical sheave displacement, all of the percentage differences are higher than was the case for Table 10 which represents the worst case

winter motions. This indicates the greater importance of wave spectral shape for lower sea states.

The major differences between the worst case motions of Table 10 and the more representative case motions of Table 12 are in the amplitudes of the motions. The periods of the motions remain essentially unchanged. The heading angles remain unchanged for all but pitch and longitudinal sheave displacement. The motions of Table 10 are from 1.54 to 2.06 times the values of Table 12.

As discussed in the previous section, higher order statistics of the motions of Table 12 are obtainable by applying the constants of Table 11.

SHIP MOTIONS WITH LOW ASSOCIATED PERIODS

Some concern has been expressed by the Ship Acoustics Department and the Hydrospace Challenger Group regarding vertical displacements of the cable sheave which occur with a low associated period. Such motions could cause an undesirable increase in cable tension. The tables of Appendix B indicate that the lowest predicted period of vertical sheave displacement is 3.9 seconds. Table 13 has been prepared to summarize worst case motions at the cable sheave occurring at 5 seconds or less. Regardless of wave spectral type, the worst cases occur in quartering-to-near-beam seas at periods of nearly 5 seconds. For a 1.4 m (4.6 ft) significant wave height, the worst case motion, from Table 13, becomes 0.49 m (1.6 ft) which corresponds to the long crested J-family occurrence. Table 3 indicates that the highest wave height in the most probable height range in winter for 5 seconds is 1.2 m (3.8 ft). Scaling the B-family motions by this wave height indicates a possible 0.32 m (1.06 ft) rms vertical sheave displacement. This value is considered the highest likely to occur at a period of 5 seconds or less. If this value causes undesirable cable tensions, operations in near-beam seas should be avoided. The likelihood of the wave condition which produces this result is rather high throughout the year, see Tables 3 to 6.

CONCLUDING REMARKS

A summary of this report is given.

1. A data base of predicted ship motions for the MONOB I is given for the ship operating at 0 knots. The data base is useful in both naval engineering and design problems as well as for at-sea operations.

2. Sea conditions producing highest motion amplitude levels, across all ship headings, for the ship operating at zero knots are identified. Due to a scarcity of measured data for the oceanographic areas of concern, Tongue of the Ocean and Exuma Sound near the Bahama Islands, several wave spectral forms have been used.

3. For engineering and design problems, the worst motions regardless of wave spectral form and ship heading should be used. Following this, the worst case RMS vertical displacement of the sheave is 1.95 m (6.4 ft) in winter. This value corresponds to a long crested, fetch-limited wave spectrum which may occur 2 percent of the time. If a less severe sea condition is considered, e.g., one which occurs about 6 percent of the time, the RMS vertical displacement is reduced to 1.06 m (3.5 ft). The period associated with the motion is 8.5 seconds, regardless of sea state used.

4. The effect of alternate ship headings on ship motion levels is important, indicating that the heading which produces the highest motions is a conservative one to use for design and engineering problems.

5. The period associated with the ship motions for a given sea condition is not substantially affected as ship heading varies from head-to-beam-to-following seas. The period associated with the ship motions for different sea conditions can vary substantially.

6. For operational purposes, the data base can be applied to determine expected motion levels as ship heading and speed vary. For open ocean transits, say from Florida to the Bahamas, the motions predicted using the Bretschneider spectra should be used. Near the coast, the long crested values may be more applicable. For operations in TOTO and Exuma Sound, the motions predicted using the mean JONSWAP spectra may be more applicable, though no effect due to depth has been included. In winter, the long crested predictions are more applicable to TOTO and the short crested to Exuma Sound.

7. Operations in near-beam seas will produce RMS vertical sheave displacements of 0.32 m (1.1 ft) at periods of 5 seconds or less. If such periods of motion produce undesirable cable tensions, even though the motion amplitude itself is small, operations in near-beam seas, e.g., 60 to 105 degrees, should be avoided.

RECOMMENDATION

Due to the uncertainty associated with the wave spectral form appropriate for describing the conditions of TOTO and Exuma Sound, it is recommended that wave measurements be carried out in conjunction with a Ship Acoustics Department full-scale trial in those waters. It is believed that the measurement and analysis of such data could be of benefit to future acoustics trials in the area.

ACKNOWLEDGMENTS

The author expresses appreciation to Mr. Terrence R. Applebee of DTNSRDC for his competent assistance in calculating and "microfiching" the ship motions presented in this work.

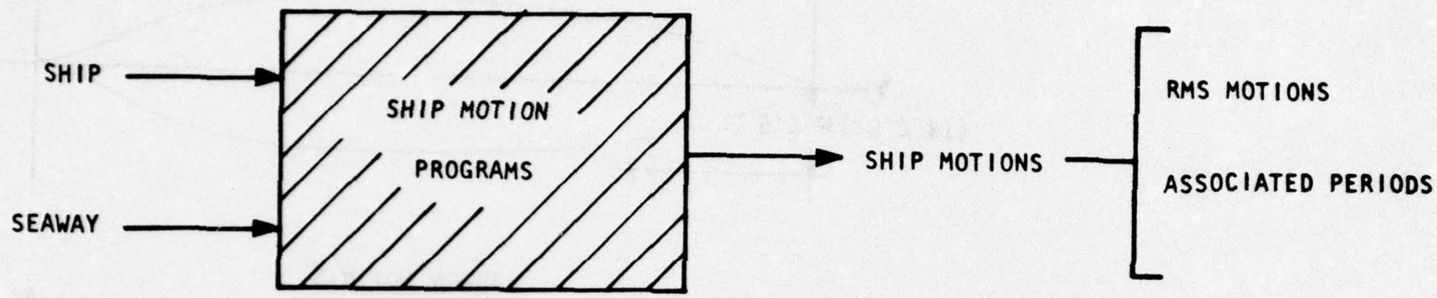


Figure 1 - Calculation Procedure

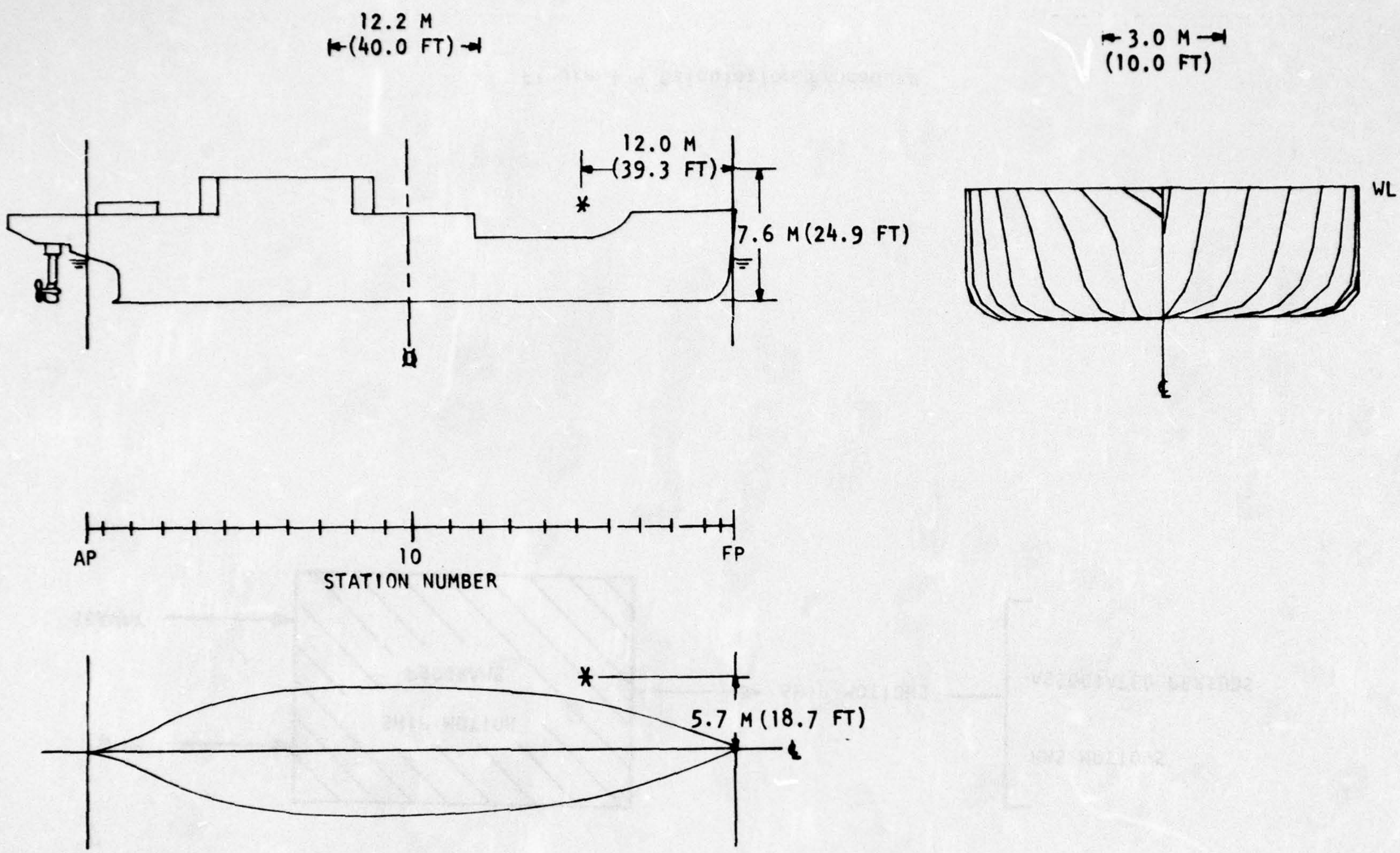


Figure 2 - Ship Geometry

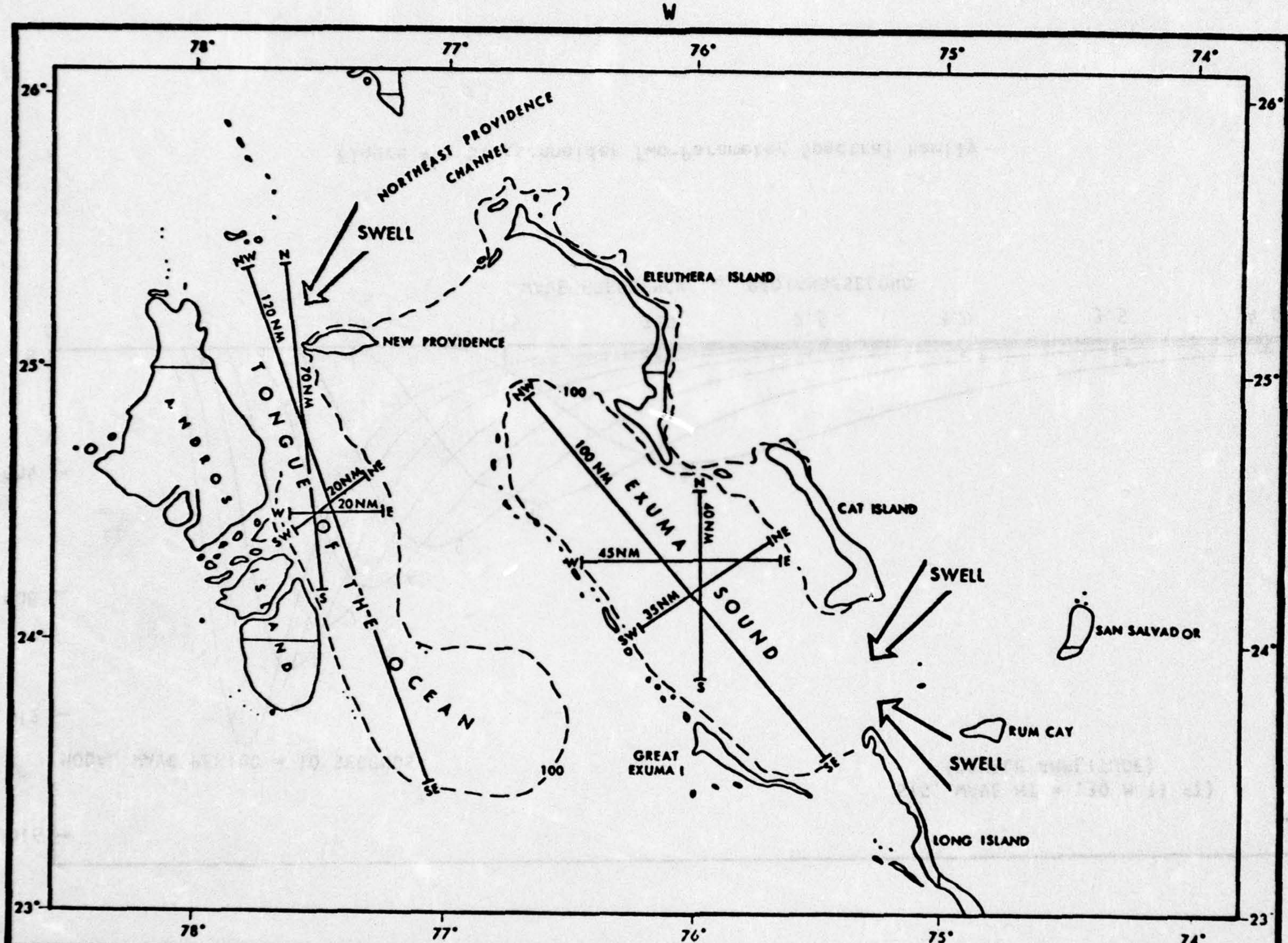


Figure 3 - Orientations of Maximum Fetch Lengths of Tongue of the Ocean (TOTO) and Exuma Sound

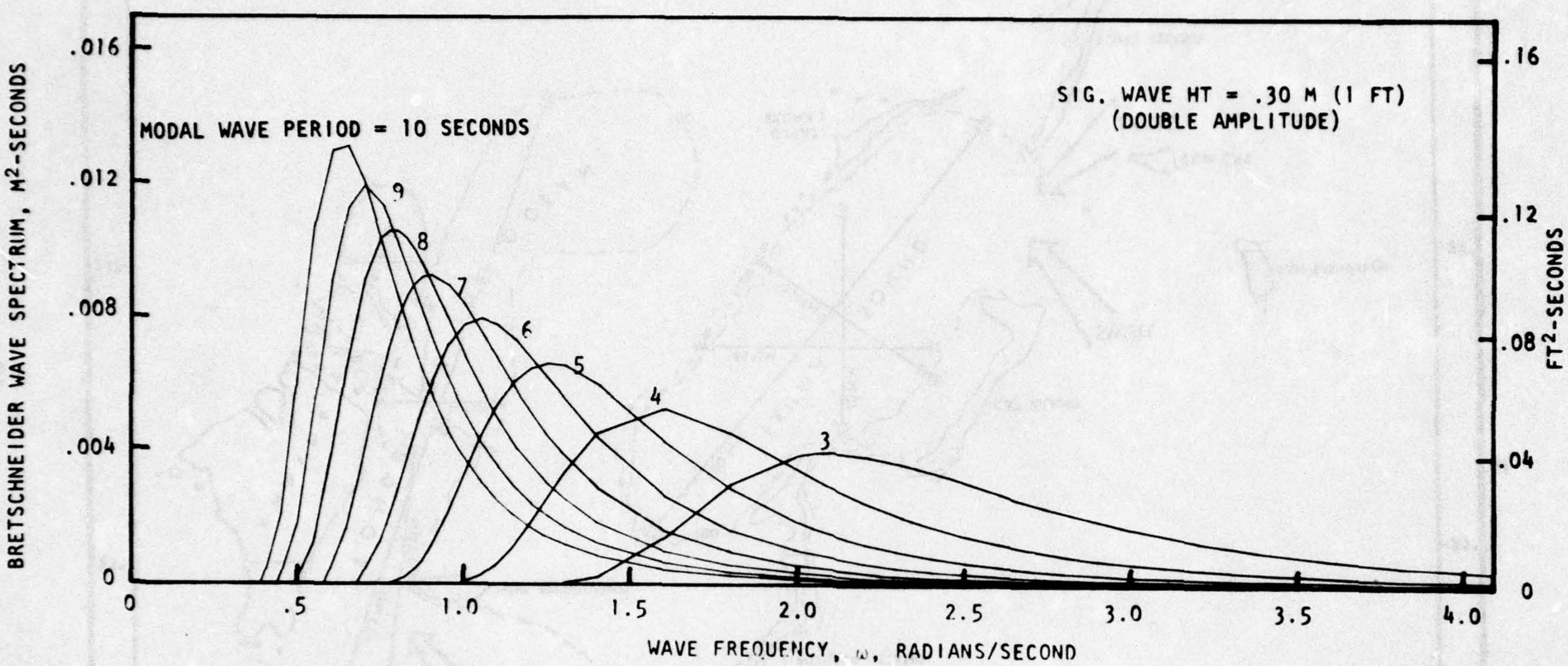
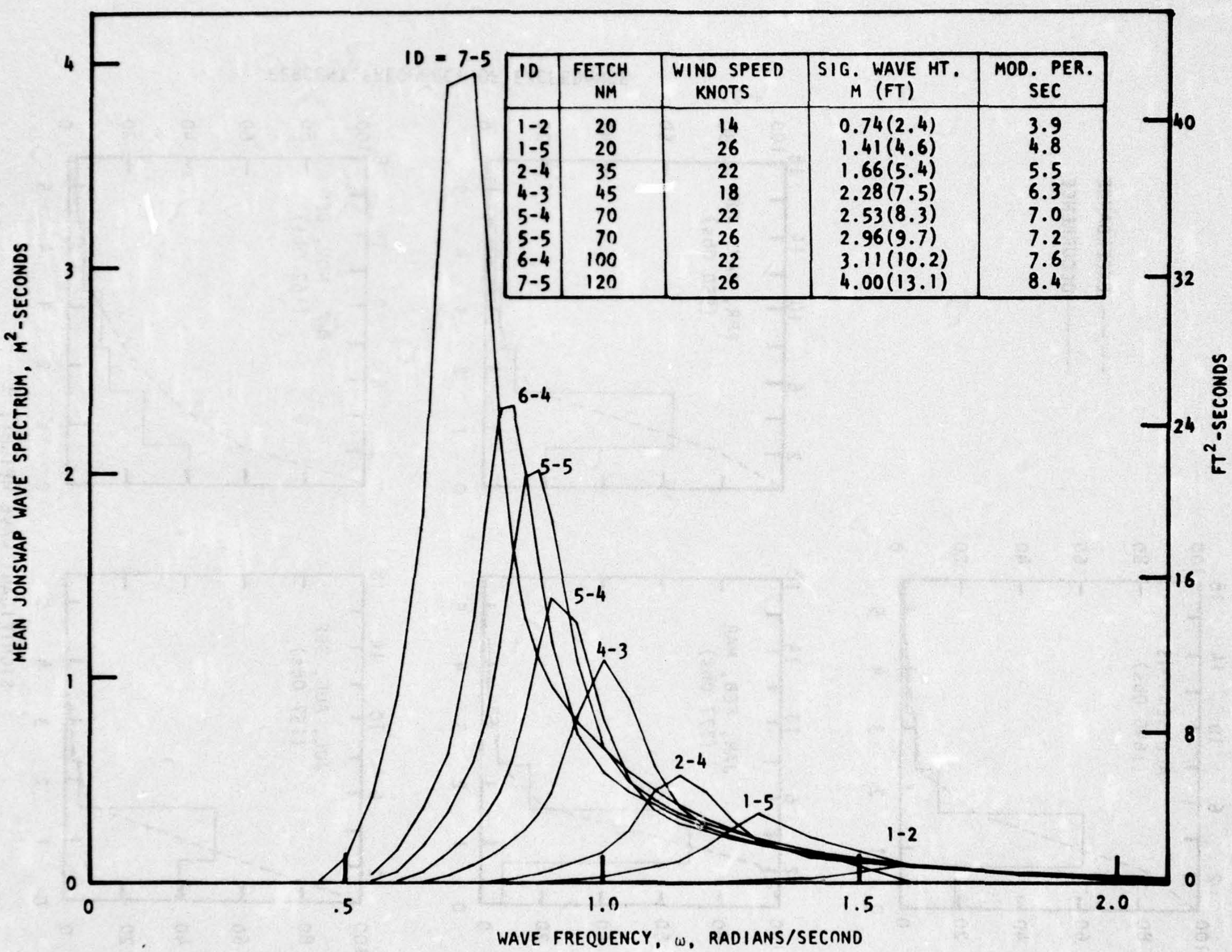


Figure 4 - Bretschneider Two-Parameter Spectral Family



ID	FETCH NM	WIND SPEED KNOTS	SIG. WAVE HT. M (FT)	MOD. PER. SEC
1-2	20	14	0.74(2.4)	3.9
1-5	20	26	1.41(4.6)	4.8
2-4	35	22	1.66(5.4)	5.5
4-3	45	18	2.28(7.5)	6.3
5-4	70	22	2.53(8.3)	7.0
5-5	70	26	2.96(9.7)	7.2
6-4	100	22	3.11(10.2)	7.6
7-5	120	26	4.00(13.1)	8.4

Figure 5 - JONSWAP Fetch-Limited Spectra

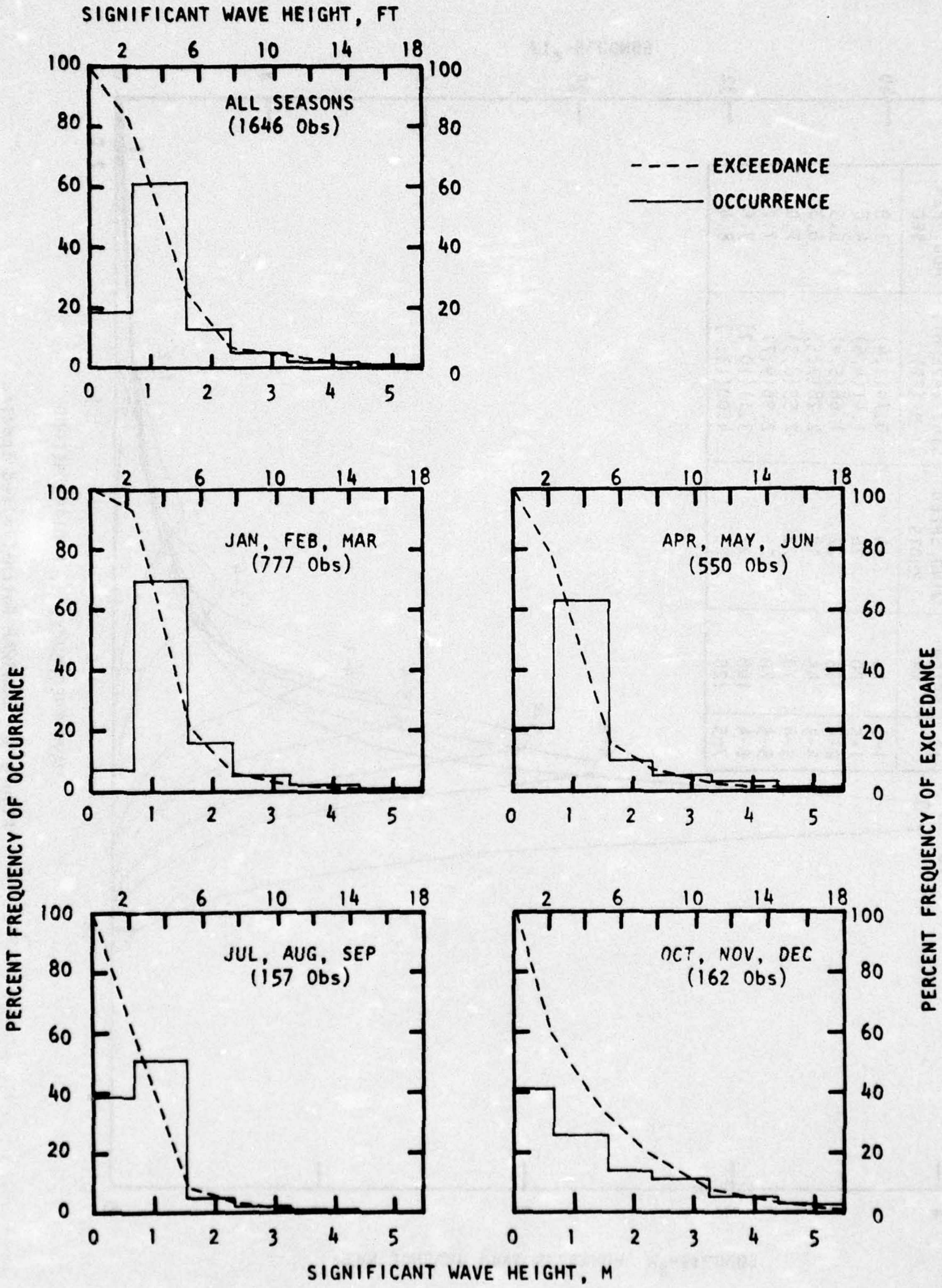


Figure 6 - Annual and Seasonal Significant Wave Height Distributions for TOTO, Derived from Reference 2

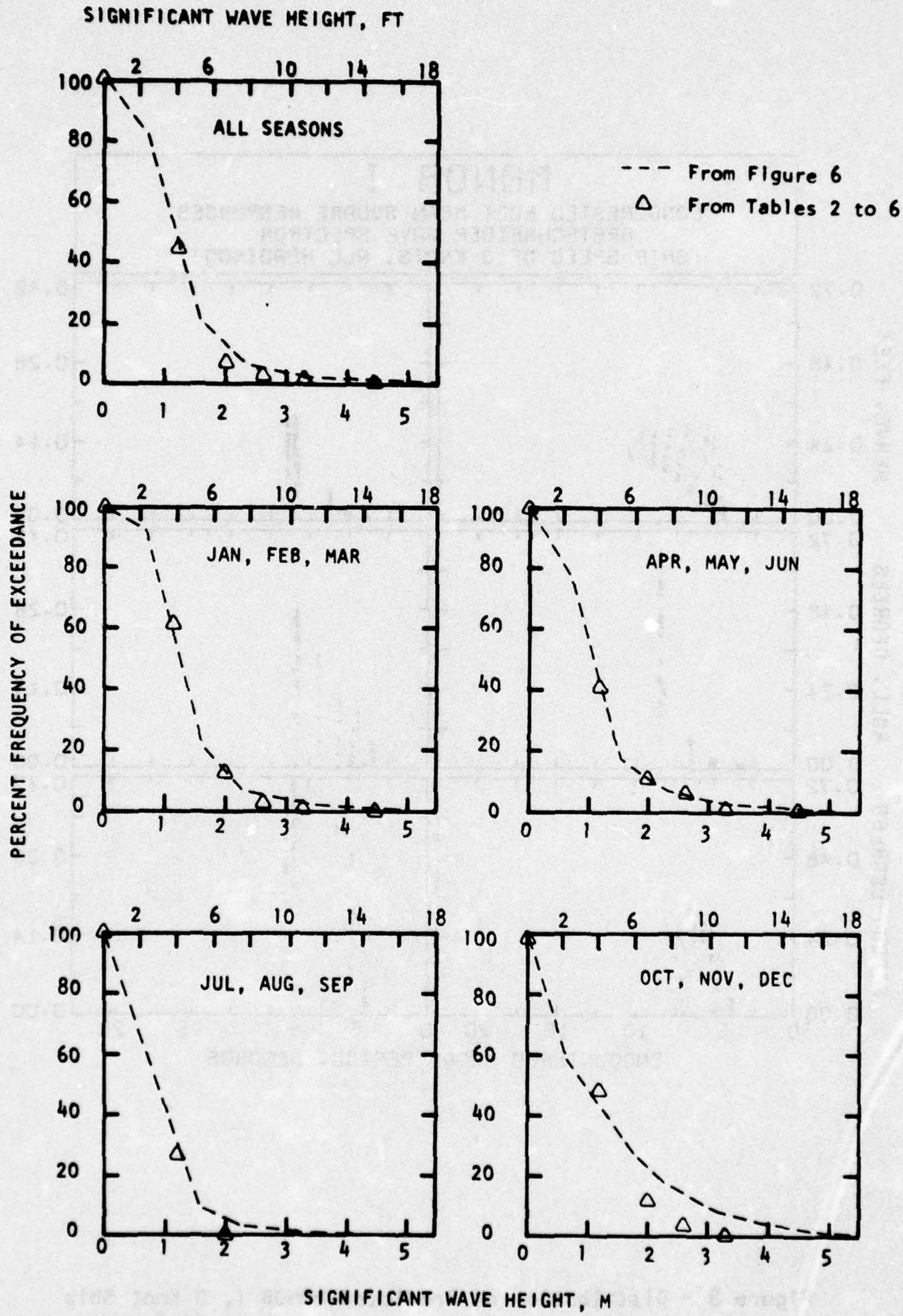


Figure 7 - Comparison of TOTO Wave Height Distributions from References 2 and 3

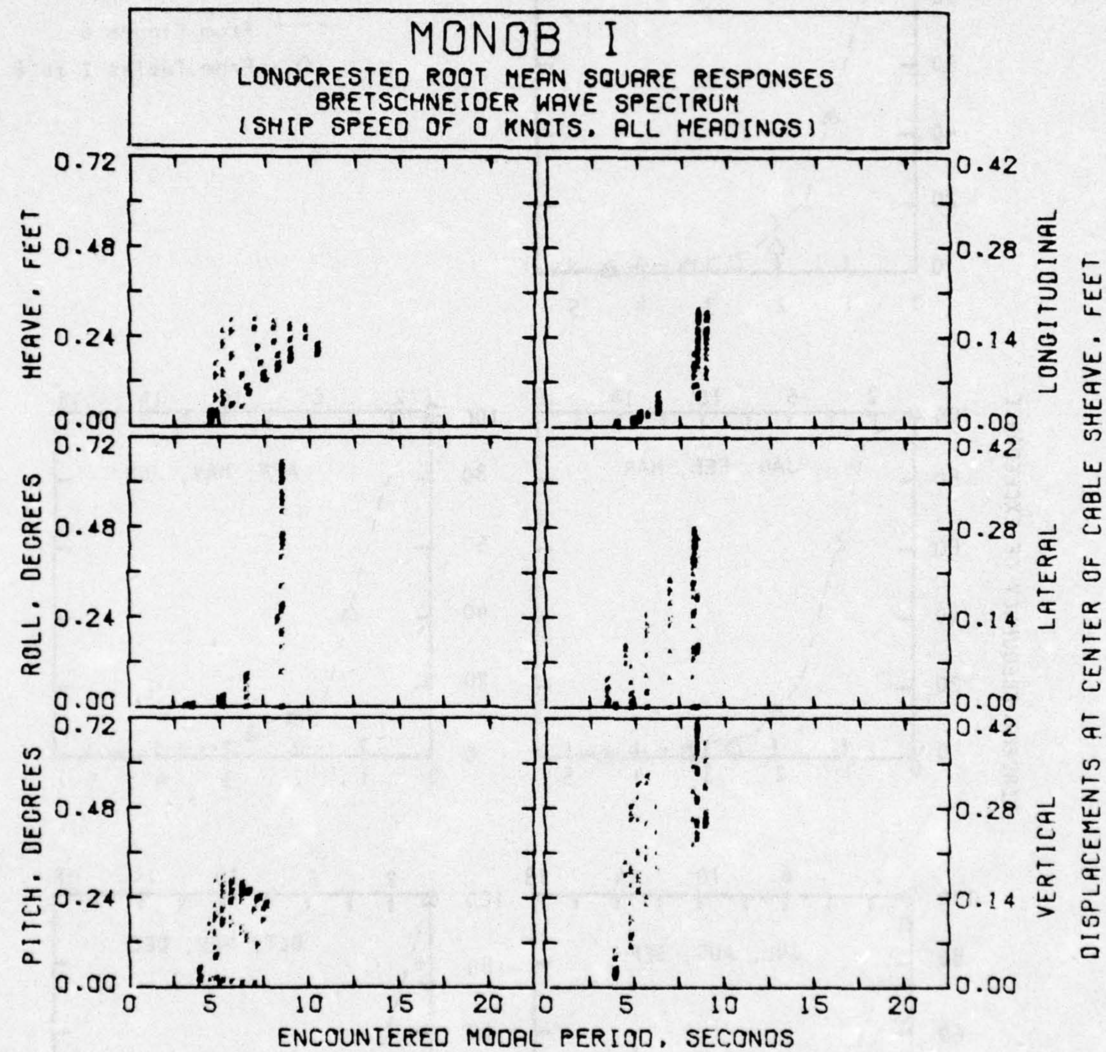


Figure 8 - Distribution of Predicted MONOB I, 0 Knot Ship Motions over Their Associated Periods for Long Crested Bretschneider Wave Spectra

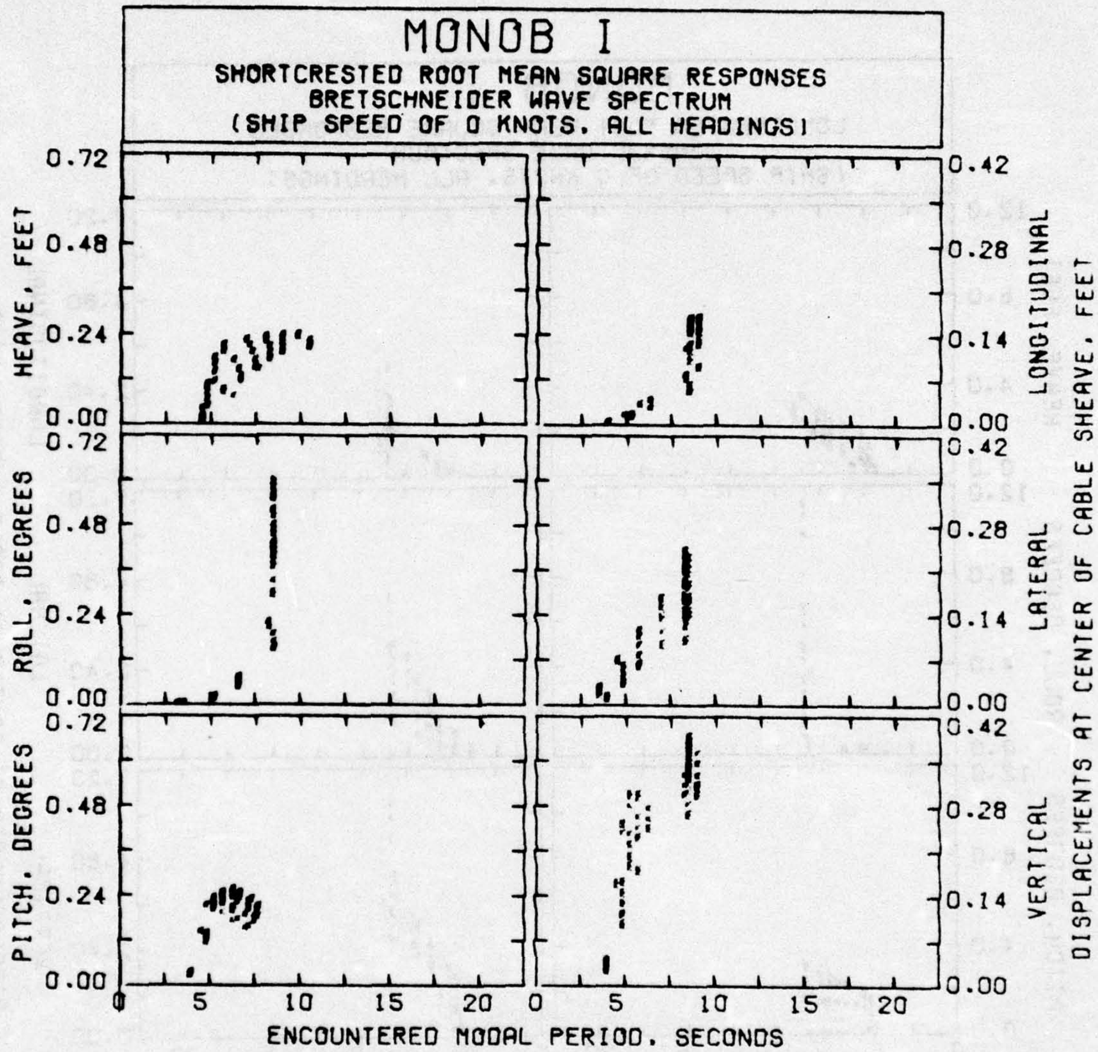


Figure 9 - Distribution of Predicted MONOB I, 0 Knot Ship Motions over Their Associated Periods for Short Crested Bretschneider Wave Spectra

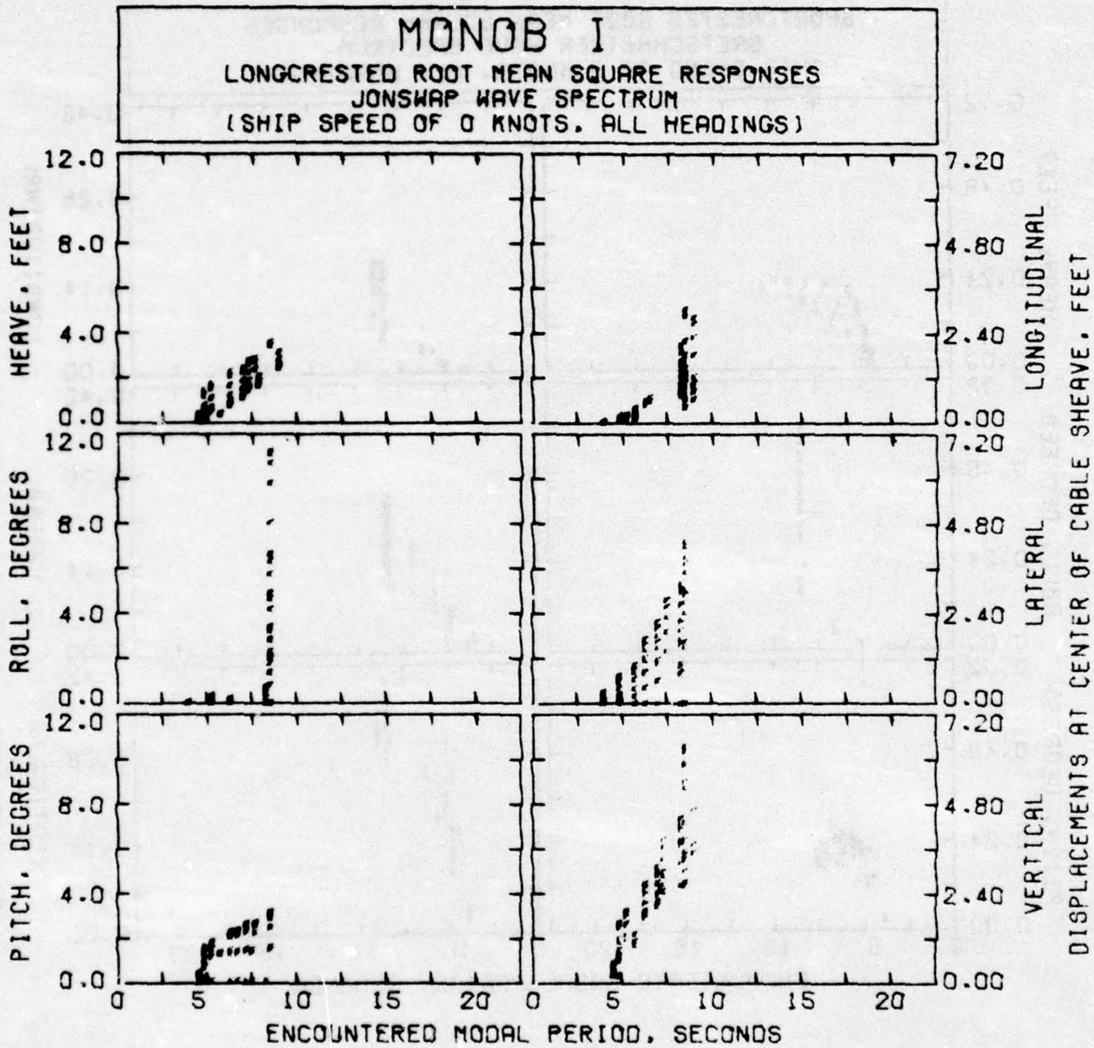


Figure 10 - Distribution of Predicted MONOB I, 0 Knot Ship Motions over Their Associated Periods for Long Crested JONSWAP Wave Spectra

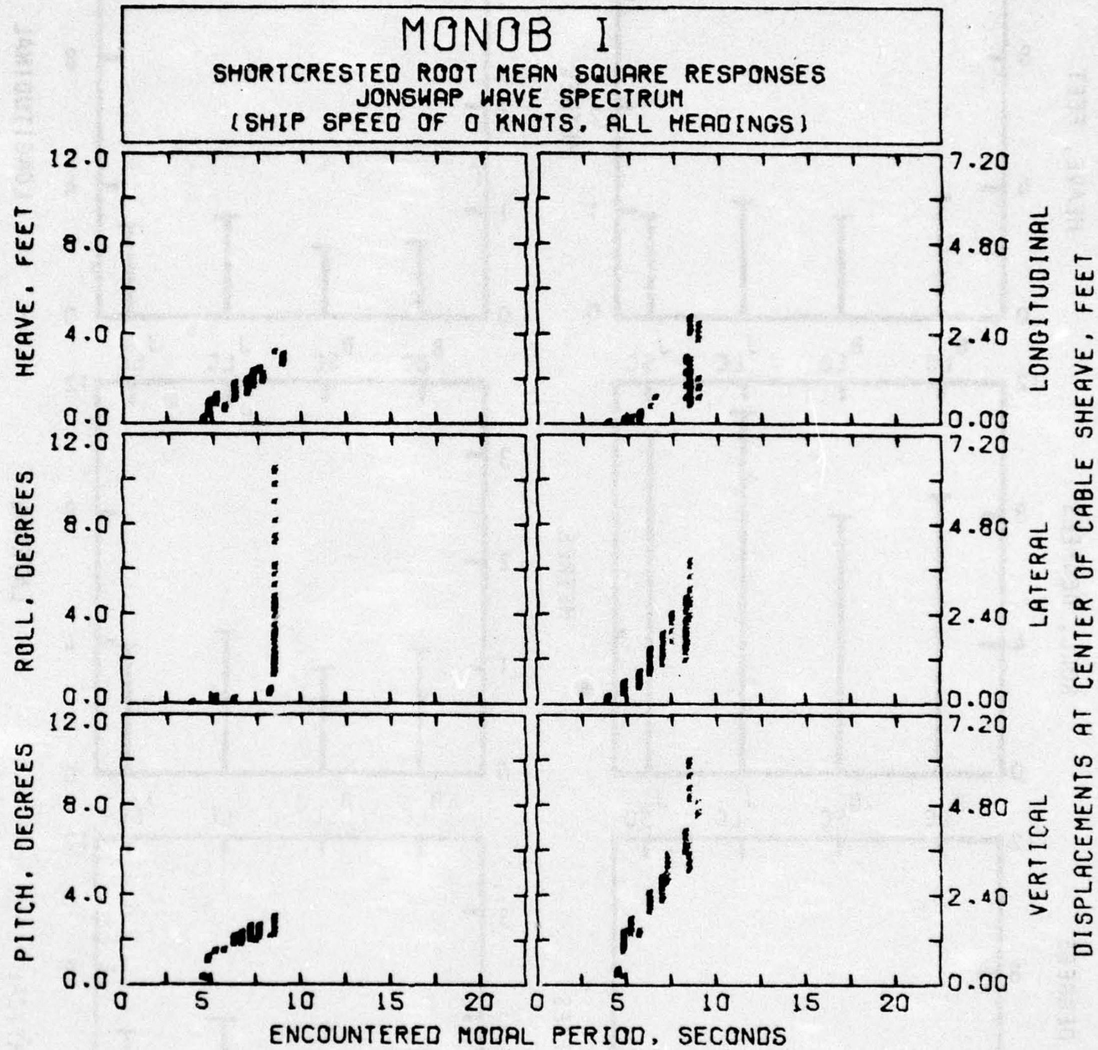


Figure 11 - Distribution of Predicted MONOB I, 0 Knot Ship Motions over Their Associated Periods for Short Crested JONSWAP Wave Spectra

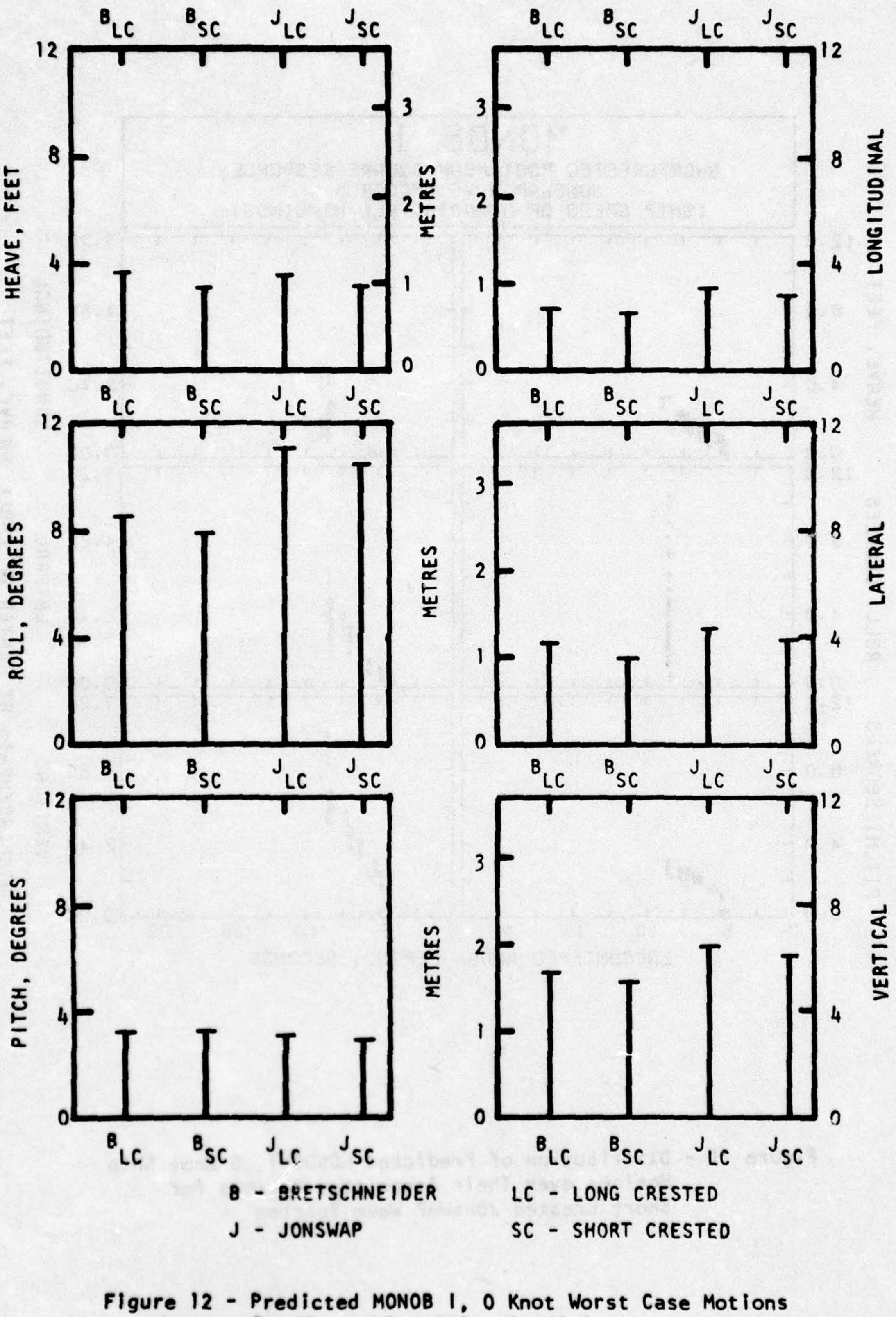


Figure 12 - Predicted MONOB I, 0 Knot Worst Case Motions for Worst Winter Sea Conditions

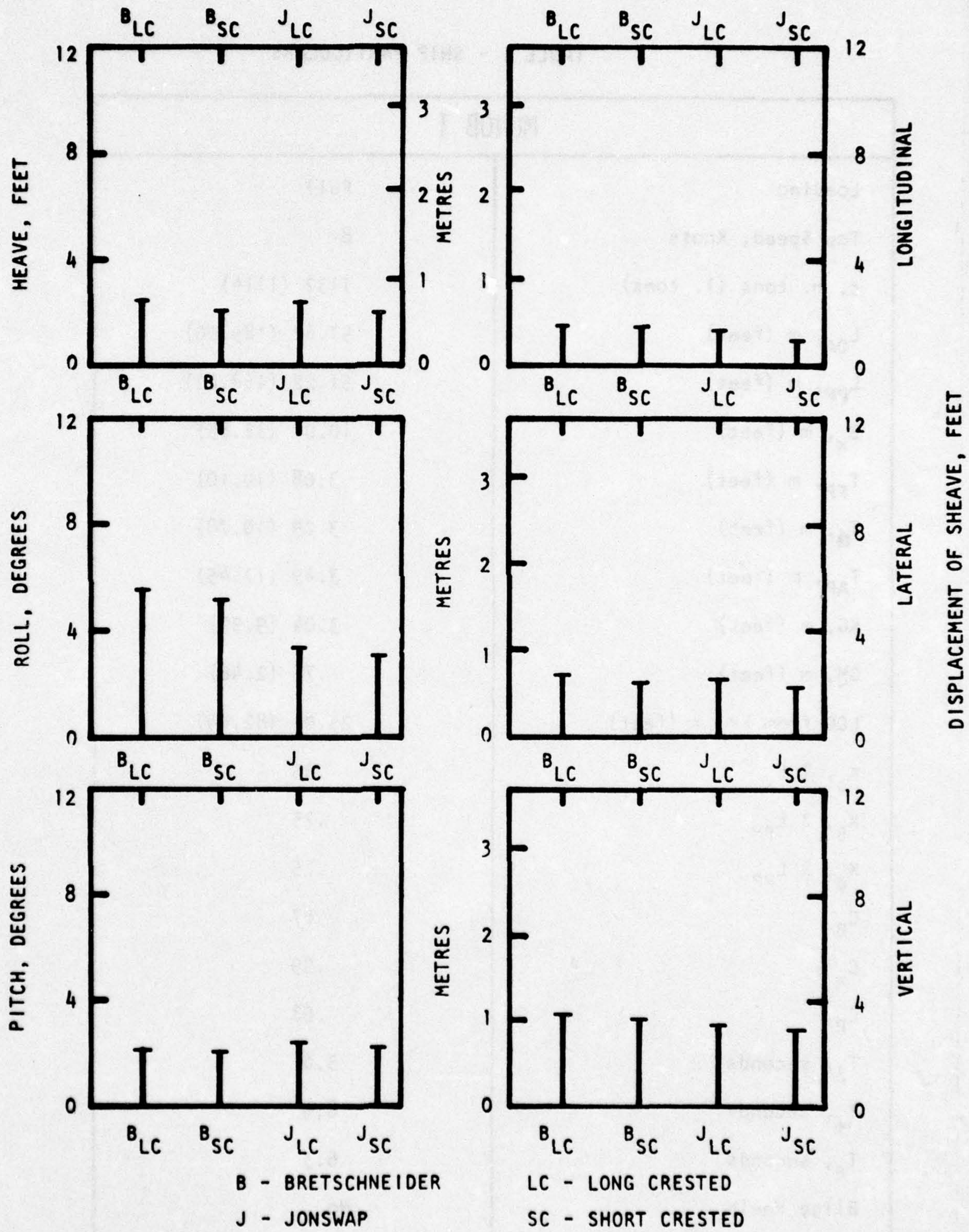


Figure 13 - Predicted MONOB I, 0 Knot Worst Case Motions for Representative Winter Sea Conditions

TABLE 1 - SHIP PARTICULARS

MONOB I	
Loading	Full
Top Speed, Knots	8
Δ, m. tons (l. tons)	1132 (1114)
L_{OA}, m (feet)	57.62 (189.00)
L_{PP}, m (feet)	51.22 (168.00)
B_x, m (feet)	10.01 (32.85)
T_{FP}, m (feet)	3.08 (10.10)
T_{Φ}, m (feet)	3.29 (10.78)
T_{AP}, m (feet)	3.49 (11.45)
KG, m (feet)	3.04 (9.99)
GM, m (feet)	.75 (2.46)
LCG from FP, m (feet)	25.01 (82.04)
K_ϕ, % B_x	.35
K_θ, % L_{PP}	.25
K_ψ, % L_{PP}	.25
C_B	.67
C_x	.99
C_P	.68
T_Z, seconds	5.0
T_ϕ, seconds	8.4
T_θ, seconds	6.3
Bilge Keels	No

TABLE 2 - OBSERVED ANNUAL WAVE HEIGHT AND PERIOD OCCURRENCES FOR TOTO

ALL SEASONS (873 OBSERVATIONS)					
Significant Wave Height, $(\tilde{\zeta}_w)_{1/3}$ m	feet	Modal Wave Period, T_o, seconds ≤ 5.4	≥ 6.6 to ≤ 9.5	≥ 9.5	Total Percent
≤ 1.2	≤ 3.8	40.49	3.95	-	44.44
> 1.2 to $\leq$ 2.0	> 3.8 to $\leq$ 6.4	23.96	12.67	0.09	36.72
> 2.0 to $\leq$ 2.6	> 6.4 to $\leq$ 8.7	2.22	3.03	0.11	5.36
> 2.6 to $\leq$ 3.3	> 8.7 to $\leq$10.8	0.60	1.51	-	2.11
> 3.3	> 10.8	0.14	0.23	-	0.37
Total %		67.41	21.39	0.20	89.00
		% Calm or Undetermined			11.00

TABLE 3 - OBSERVED WINTER WAVE HEIGHT AND PERIOD OCCURRENCES FOR TOTO

JANUARY, FEBRUARY, MARCH (261 OBSERVATIONS)					
Significant Wave Height, $(\tilde{\zeta}_w)_{1/3}$ m	feet	Modal Wave Period, T_o, seconds ≤ 5.4	≥ 6.6 to ≤ 9.5	≥ 9.5	Total Percent
≤ 1.2	≤ 3.8	20.32	11.62	-	31.94
> 1.2 to ≤ 2.0	> 3.8 to ≤ 6.4	13.50	37.50	-	51.00
> 2.0 to ≤ 2.6	> 6.4 to ≤ 8.7	2.88	3.95	-	6.82
> 2.6 to ≤ 3.3	> 8.7 to ≤ 10.8	0.38	2.34	-	2.72
> 3.3	> 10.8	0.46	0.19	-	0.65
Total %		37.54	55.60		93.14
		% Calm or Undetermined			6.86

TABLE 4 - OBSERVED SPRING WAVE HEIGHT AND PERIOD OCCURRENCES FOR TOTO

APRIL, MAY, JUNE (211 OBSERVATIONS)					
Significant Wave Height, $(\tilde{\zeta}_w)_{1/3}$ m	feet	Modal Wave Period, T_o, seconds $\leq$ 5.4	$\geq$ 6.6 to $\leq$ 9.5	$\geq$ 9.5	Total Percent
$\leq$ 1.2	$\leq$ 3.8	46.94	-	-	46.94
> 1.2 to $\leq$ 2.0	> 3.8 to $\leq$ 6.4	29.76	0.66	0.38	30.80
> 2.0 to $\leq$ 2.6	> 6.4 to $\leq$ 8.7	5.65	1.61	0.47	7.74
> 2.6 to $\leq$ 3.3	> 8.7 to $\leq$10.8	1.99	0.71	-	2.70
> 3.3	> 10.8	-	0.71	-	0.71
Total %		84.35	3.69	0.85	88.89
		% Calm or Undetermined			11.11

TABLE 5 - OBSERVED SUMMER WAVE HEIGHT AND PERIOD OCCURRENCES FOR TOTO

JULY, AUGUST, SEPTEMBER (254 OBSERVATIONS)					
Significant Wave Height, $(\tilde{\zeta}_w)_{1/3}$ m	feet	Modal Wave Period, T_o, seconds ≤ 5.4	≥ 6.6 to ≤ 9.5	≥ 9.5	Total Percent
≤ 1.2	≤ 3.8	56.14	-	-	56.14
> 1.2 to $\leq$ 2.0	> 3.8 to $\leq$ 6.4	26.97	-	-	26.97
> 2.0 to $\leq$ 2.6	> 6.4 to $\leq$ 8.7	-	-	-	-
> 2.6 to $\leq$ 3.3	> 8.7 to $\leq$10.8	-	-	-	-
> 3.3	> 10.8	-	-	-	-
Total %		83.11			83.11
		% Calm or Undetermined			16.89

TABLE 6 - OBSERVED FALL WAVE HEIGHT AND PERIOD OCCURRENCES FOR TOTO

OCTOBER, NOVEMBER, DECEMBER (147 OBSERVATIONS)					
Significant Wave Height, $(\tilde{\zeta}_w)_{1/3}$ m	feet	Modal Wave Period, T_o, seconds ≤ 5.4	≥ 6.6 to ≤ 9.5	≥ 9.5	Total Percent
≤ 1.2	≤ 3.8	39.96	2.88	-	42.84
> 1.2 to ≤ 2.0	> 3.8 to ≤ 6.4	28.96	7.67	-	36.63
> 2.0 to ≤ 2.6	> 6.4 to ≤ 8.7	-	8.63	-	8.63
> 2.6 to ≤ 3.3	> 8.7 to ≤ 10.8	-	3.84	-	3.84
> 3.3	> 10.8	-	-	-	-
Total %		68.92	23.02		91.94
		% Calm or Undetermined			8.06

TABLE 7 - SEA STATE DEFINITION

Sea State	Significant Wave Height m	Significant Wave Height ft
1	0.00 - 0.58	0.0 - 1.9
2	0.58 - 1.26	1.9 - 4.1
3	1.26 - 1.72	4.1 - 5.7
4	1.72 - 2.24	5.7 - 7.4
5	2.24 - 3.98	7.4 - 13.0
6	3.98 - 6.34	13.0 - 20.8
7	6.34 - 12.30	20.8 - 40.3
8	12.30 - 18.77	40.3 - 61.6

TABLE 8 - SEASONAL REPRESENTATIVE SEA CONDITIONS FOR TOTO AND EXUMA SOUND

Season	TOTO	Exuma Sound
Winter	Long Crested 1.2 to 2.0 m* 6.6 to 9.5 sec**	Short Crested 1.5 to 2.6 m 6.6 to 9.5 sec
Spring	Short Crested $\leq$ 1.2 m $\leq$ 5.4 sec	Short Crested $\leq$ 1.8 m $\leq$ 5.4 sec
Summer	Short Crested $\leq$ 1.2 m $\leq$ 5.4 sec	Short Crested $\leq$ 1.5 m $\leq$ 5.4 sec
Fall	Long Crested $\leq$ 1.2 m $\leq$ 5.4 sec	Short Crested $\leq$ 1.7 m $\leq$ 5.4 sec

*Significant wave height.

**Modal wave period.

TABLE 9 - IDENTIFICATION OF MONOB I, 0 KNOT WORST CASE MOTION OCCURRENCES FOR WINTER OPERATIONS IN TOTO AND EXUMA SOUND

Spectral Family and Spreading	Significant Wave Height m (ft)	Heave m (ft)	Roll deg	Pitch deg
B_{LC}	0.3(1.0)	0.087(0.29)/6.3/ 90/ 7.0	0.65/8.5/ 90/9.0	0.25/6.7/ 150/8.0
B_{SC}	0.3(1.0)	0.074(0.24)/9.8/ 90/10.0	0.61/8.5/ 90/9.0	0.26/6.3/ 180/7.0
J_{LC}	4.0(13.1)	1.10 (3.60)/8.5/ 90/ 8.4	11.2 /8.5/ 90/8.4	3.2 /8.5/ 0,15/8.4
J_{SC}	4.0(13.1)	0.98 (3.20)/8.5/ 75,90/ 8.4	10.5 /8.5/ 90/8.4	3.0 /8.5/0,15,165,180/8.4
J_{LC}	2.6(8.5)	0.73 (2.40)/7.0/ 90/ 7.0	3.4 /8.5/75-105/7.0	2.4 /6.7/ 30-45/7.0
J_{SC}	2.6(8.5)	0.61 (2.00)/7.0/75-105/ 7.0	3.1 /8.5/75-105/7.0	2.3 /6.7/ 0,15,165/7.0

Spectral Family and Spreading	Significant Wave Height m (ft)	Sheave Displacement Longitudinal m (ft)	Sheave Displacement Lateral m (ft)	Sheave Displacement Vertical m (ft)
B_{LC}	0.3(1.0)	0.054(0.18)/9.0/ 135/10.0	0.085(0.28)/8.3/ 75/8.0	0.126(0.42)/8.5/ 105/9.0
B_{SC}	0.3(1.0)	0.052(0.17)/9.0/ 105/10.0	0.074(0.24)/8.3/ 90/8.9	0.119(0.39)/8.5/ 90/9.0
J_{LC}	4.0(13.1)	0.94 (3.10)/8.5/ 45/ 8.4	1.31 (4.30)/8.5/ 75/8.4	1.95 (6.40)/8.5/ 105/8.4
J_{SC}	4.0(13.1)	0.85 (2.80)/8.5/60-105/ 8.4	1.16 (3.80)/8.5/75,90/8.4	1.82 (6.00)/8.5/ 90,105/8.4
J_{LC}	2.6(8.5)	0.40 (1.30)/8.3/ 45/ 7.0	0.67 (2.20)/7.0/75,90/7.0	0.94 (3.10)/7.0/105,120/7.0
J_{SC}	2.6(8.5)	0.30 (1.00)/8.3/ 0-75/ 7.0	0.58 (1.90)/7.0/75,90/7.0	0.88 (2.90)/7.0/ 90,105/7.0

B indicates Bretschneider and J means JONSWAP spectral forms. LC means long crested and SC short crested seas.

For example, in a Bretschneider long crested seaway characterized by a .30 m (1.00-ft) significant wave height and a period of 9.0 seconds, the vertical sheave displacement near-beam seas (105 degrees) is .126 m (.42 ft) and occurs with a period of 8.5 seconds.

TABLE 10 - MONOB I, 0 KNOT WORST CASE MOTIONS FOR SEVERE WINTER SEAS OF SIGNIFICANT WAVE HEIGHT 4.0 M (13.1 FT)

Motion	RMS/T_{OE}/μ/T_o
Heave, m (ft)	1.15 (3.77)/6.3/ 90/7
Roll, deg	11.2/8.5/ 90/8.4
Pitch, deg	3.37/6.3/180/7
Sheave Lon. Dis., m (ft)	0.94 (3.1) /8.5/ 45/8.4
Sheave Lat. Dis., m (ft)	1.31 (4.3) /8.5/ 75/8.4
Sheave Ver. Dis., m (ft)	1.95 (6.4) /8.5/105/8.4

For example, the worst rms ver. dis. of the sheave, 1.95 m (6.4 ft), occurs at a period of 8.5 seconds, in near-beam seas (105 degrees). The seas are characterized by a significant wave height of 4 m (13.1 ft) and a period of 8.4 seconds.

TABLE 11 - STATISTICAL CONSTANTS FOR SINGLE AND DOUBLE AMPLITUDE SHIP MOTIONS AND WAVE HEIGHTS

Root mean square amplitude, RMS	= 1.00 σ
Average amplitude	= 1.25 σ
Average of highest 1/3 amplitudes, significant	= 2.00 σ
Highest expected amplitude in 10 successive amplitudes	= 2.15 σ
Average of highest 1/10 amplitudes	= 2.55 σ
Highest expected amplitude in 30 successive amplitudes	= 2.61 σ
Highest expected amplitude in 50 successive amplitudes	= 2.80 σ
Highest expected amplitude in 100 successive amplitudes	= 3.03 σ
Highest expected amplitude in 200 successive amplitudes	= 3.25 σ
Highest expected amplitude in 1000 successive amplitudes	= 3.72 σ

σ^2 = Statistical variance of time history

N = Number of successive amplitudes

CONSTANT = $\sqrt{2}\,(\ell n\ N)^{1/2}$, where CONSTANT relates σ to the highest expected amplitude in N successive amplitudes

NOTES:

1. The highest expected amplitude in N amplitudes is the most probable extreme value in N amplitudes. This value may be exceeded 63 percent of the time.
2. Double amplitudes are obtained by multiplying the above constants by 2.00.

TABLE 12 - MONOB I, 0 KNOT WORST CASE MOTIONS FOR REPRESENTATIVE WINTER SEAS OF SIGNIFICANT WAVE HEIGHT 2.6 M (8.5 FT)

Motion	RMS/T_{OE}/μ/T_o
Heave, m (ft)	0.73 (2.4)/6.3/ 90/7
Roll, deg	5.6/8.5/ 90/9
Pitch, deg	2.4/6.7/15-45/7
Sheave Lon. Dis., m (ft)	0.46(1.5)/9.0/135/10
Sheave Lat. Dis., m (ft)	0.73(2.4)/8.3/ 75/8
Sheave Ver. Dis., m (ft)	1.06(3.5)/8.5/105/9

For example, the worst rms ver. dis. of the sheave, 1.06 m (3.5 ft), occurs at a period of 8.5 seconds, in near-beam seas (105 degrees). The seas are characterized by a significant wave height of 2.60 m (8.5 ft) and a period of 9 seconds.

TABLE 13 - MONOB I, 0 KNOT WORST CASE MOTIONS OCCURRING AT FIVE SECONDS OR LESS

Spectral Family and Spreading	Significant Wave Height m (ft)	$RMS/T_{OE}/\mu/T_O$ Vertical Sheave Displacement m (ft)
B_{LC}	0.3 (1.0)	0.08 (.28)/4.8/105/5
B_{SC}	0.3 (1.0)	0.08 (.26)/4.8/90/5
J_{LC}	1.4 (4.6)	0.49 (1.60)/4.8/75-105/4.8
J_{SC}	1.4 (4.6)	0.43 (1.40)/4.8/75-105/4.8

B indicates Bretschneider and J indicates JONSWAP spectral forms. LC means long crested and SC short crested seas. For example, in a Bretschneider long crested seaway characterized by a 0.3 m (1.0-ft) significant wave height and a period of 5.0 seconds, the vertical sheave displacement near-beam seas (105 degrees) is 0.086 m (0.28 ft) and occurs with a period of 4.8 seconds.

APPENDIX A

DEFINITIONS AND COMPARISONS OF BRETSCHNEIDER AND MEAN JONSWAP WAVE SPECTRA

Due to a dearth of measured wave spectra for TOTO and Exuma Sound, a difficulty in selecting an appropriate wave spectral form for ship motion predictions existed in the early stages of this work. The waves of TOTO and Exuma Sound are at least partially limited by fetch, e.g., when considering predominant wind directions, and both local wind driven and incoming swell waves can occur, see Figure 3. The difficulty was resolved by selecting two separate spectral forms, of which one is more representative of open ocean areas and the other of fetch-limited areas. Both forms were used to define long crested (unidirectional) and short crested (multidirectional) seas. The short crested seas were modeled by spreading the spectral wave energy to $\pm$ 90 degrees of a predominant wave direction by using a "cosine-squared" law. This procedure for "short cresting" the seas is the most common one currently in use in ship performance prediction evaluations.

The two spectral forms used are the Bretschneider two-parameter formulation, see Reference 6, and the mean JONSWAP so-called five-parameter formulation, see Reference 7. The Bretschneider spectral density equation, as used in this work, is

$$S_\zeta(\omega) = A\omega^{-5} \exp\left[- B/\omega^4\right] \quad ft^2 \cdot sec$$

$$\text{where} \quad A = 483.5\ (\tilde{\zeta}_W)^2_{1/3}/T_o{}^4 \quad ft^2 \cdot sec^{-4} \qquad (4)$$

$$\text{and} \quad B = 1944.5/T_o{}^4 \quad sec^{-4}$$

The two parameters are significant wave height, $(\tilde{\zeta}_W)_{1/3}$ in ft, and modal wave period, T_o in sec. ω is the circular wave frequency in rad $\cdot$ sec^{-1}. Equation 4 represents the energy of a long crested seaway and Figure 4 shows typical spectra when T_o varies from 3 to 10 seconds and the significant wave height is held constant.

The Bretschneider spectrum is currently widely used in ship design and naval engineering problems. Previous to the Bretschneider form, the Pierson-Moskowitz one-parameter (significant wave height) spectral form was most heavily used. The Pierson-Moskowitz spectrum is representative of open ocean fully developed seas and can be determined from equation 4 by setting

$$T_o = 2.76 \, [(\tilde{\zeta}_w)_{1/3}]^{1/2} \qquad (5)$$

where $(\tilde{\zeta}_w)_{1/3}$ is in feet.

The JONSWAP spectral density equation for long crested seas as used in this work is

$$S_\zeta(f) = \alpha \, g^2 \, (2\pi)^{-4} \, f^{-5} \exp\left[-\frac{5}{4}\left(\frac{f}{f_o}\right)^{-4}\right] \gamma^{\exp[-(f - f_o)^2/(2\sigma^2 f_o^2)]} \qquad m^2 \cdot sec \qquad (6)$$

where f is the wave frequency in cycles $\cdot$ sec^{-1}, f_o is the frequency at the spectral peak, and g is the acceleration due to gravity. The five parameters are α, γ, σ_a, σ_b, f_o, see Figure 14. In this work, a "mean" JONSWAP spectrum has been used, so γ is 3.3, σ_a is 0.07, and σ_b is 0.09. These represent average values and are further discussed in Reference 7. The remaining two parameters α and f_o are dependent on the wind speed and fetch,

$$\alpha = 0.076 \, \tilde{X}^{-.22}$$

$$f_o = \tilde{f}_o \, g/U \qquad (7)$$

where $\tilde{X} = g \, X/U^2$

and $\tilde{f}_o = 3.5 \, \tilde{X}^{-.33}$

X is the fetch in nautical miles. The wind speed U is taken to be at 10 m and is in units of knots. The fetch and wind speed values given in the table on

Figure 5 were used together with equations 5 and 6 to define the spectra shown on the figure.

The JONSWAP spectral form represents a generalization of the Pierson-Moskowitz form by inclusion of fetch as an additional parameter to wind speed. If α is .0081 and γ is 1 in equation 6, the JONSWAP spectral form is identical to the Pierson-Moskowitz form. Figure 15 compares a typical Pierson-Moskowitz spectrum with significant wave height of 4 m (13.1 ft) with the corresponding JONSWAP form of significant wave height 4.9 m (16.0 ft). The wind speed is 15 knots. It is rather obvious that the JONSWAP spectrum contains more energy than the corresponding Pierson-Moskowitz spectrum for the same values of f_o and α. The differences between ship motions calculated using the two different spectra will be greatest when the ship response amplitude operators are finely tuned (sharply peaked).

It is obvious that equation 6 can be rewritten to be more compatible with equation 4 by converting f to ω, metres to feet, etc. Due to time restrictions in the writing and publishing of the report, this has not been done. Rather the equations have been shown just as presented in Reference 7 and as programmed for the work. Units were corrected internal to the computer program. For example, to convert f to ω multiply by 2π, and to convert $S_\zeta(f)$ in $m^2 \cdot sec$ to $S_\zeta(\omega)$ in $ft^2 \cdot sec$, multiply by $(3.28)^2$ and divide by 2π. Work soon to be published by the Ship Performance Department regarding the appropriate seas for ship design will provide a comparative listing of the equations for the Bretschneider, JONSWAP, and Pierson-Moskowitz forms such that they are all compatible.

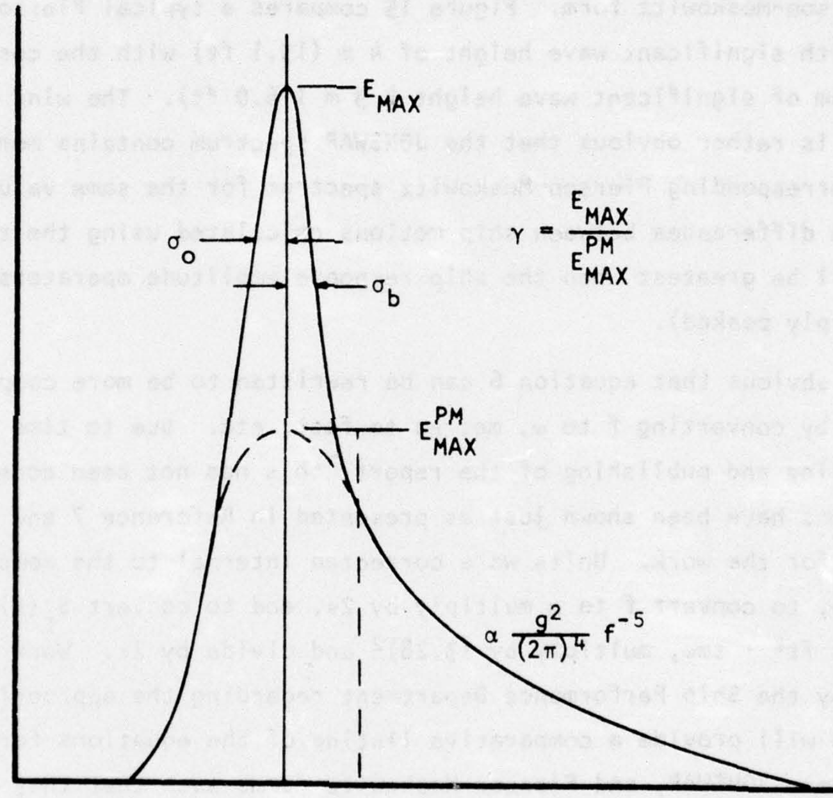


Figure 14 - Description of Five Defining Parameters of the JONSWAP Spectrum

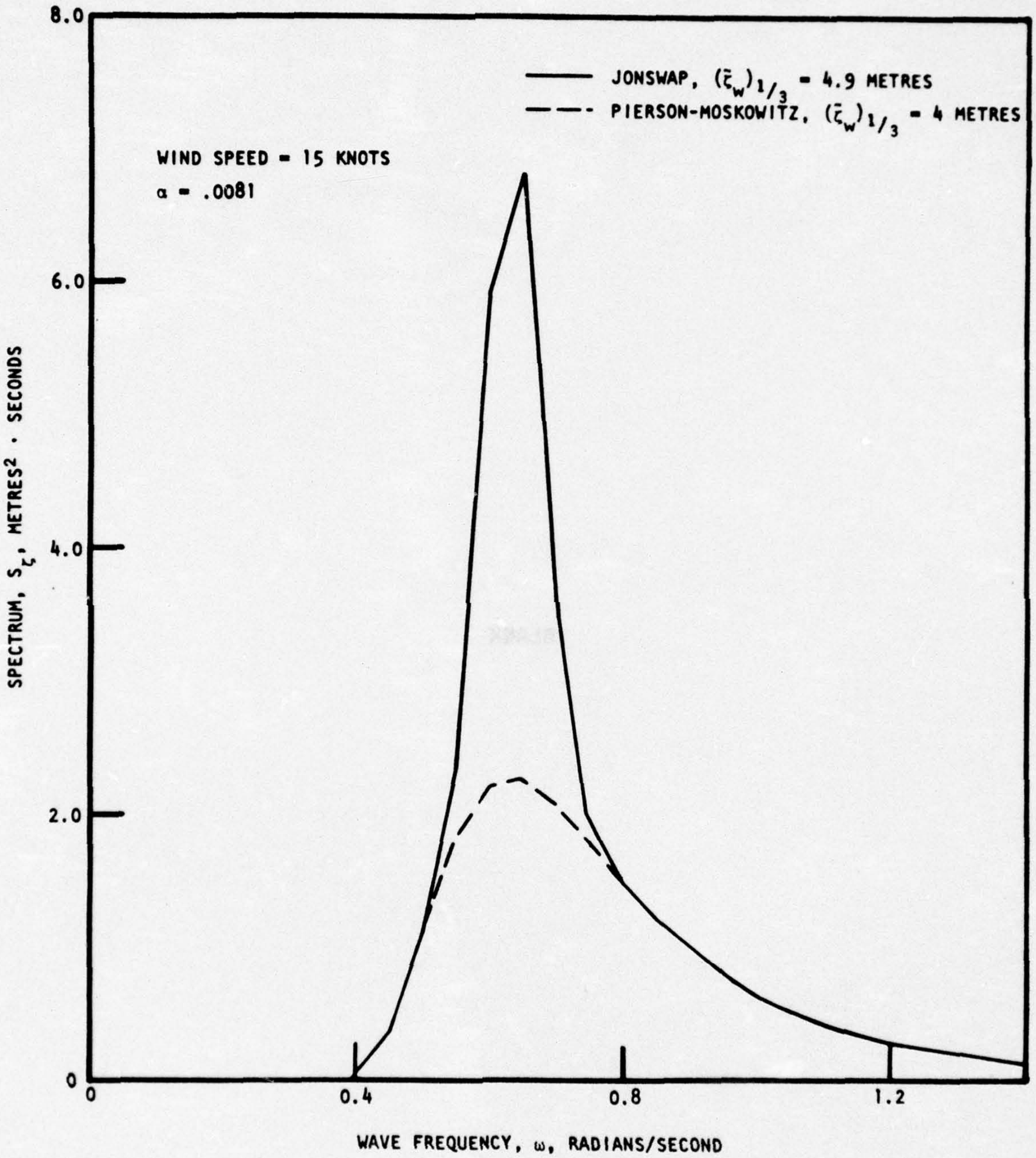


Figure 15 - Comparison of Pierson-Moskowitz and JONSWAP Spectral Shapes for a Wind Speed of 15 Knots

APPENDIX B

DATA BASE OF MONOB I SHIP MOTION PREDICTIONS

Table 14 presents a listing of the numbers of the tables of predicted ship motions included in this work. The tables contain the RMS ship motions and associated periods, T_{OE}, at the CG as well as the center of the cable sheave for 0, 3, and 6 knots. The 0-knot data is of primary interest in the current work. Additional data, namely the velocities and accelerations for the same cases, as well as the spectra, are stored on microfiche and available upon request.

The tables of motions and periods are in four groups, one for each wave spectral type, namely the Bretschneider long crested, the Bretschneider short crested, the JONSWAP long crested, and the JONSWAP short crested. Heights and periods defining the eight spectral conditions in each case are located on the tables. Tables 15 to 26 are for the Bretschneider cases and Tables 27 to 38 are for the JONSWAP cases. As Tables 15 to 26 are for a 0.3 m (1-ft) significant wave height, motion values from them should be multiplied by wave height in order to predict for any sea state. In addition, Table 11 can be used to determine higher order statistics. For example, using Table 11 and Table 20, the highest expected vertical displacement of the cable sheave in 100 occurrences in a Sea State 2 which is characterized by a significant wave height of 1.22 m (4 ft) and a modal period of 7 seconds when the ship is at rest in head unidirectional seas is found by

$$3.03 \times 4 \times .224/3.28 = 0.83 \text{ m } (2.7 \text{ ft}).$$

Tables 27 to 38 are used similarly though it is unnecessary to include significant wave height in the multiplication. Only the statistical constant, selected from Table 11, is required for determining the ship motions for the fetch-limited case.

TABLE 14 - MONOB I, DESCRIPTION OF DATA BASE TABLES OF SHIP MOTIONS AND PERIODS FOR 0, 3, AND 6 KNOTS

Motion	RMS Motion/Period Table Numbers			
	B_{LC}	B_{SC}	J_{LC}	J_{SC}
Roll	15	21	27	33
Pitch	16	22	28	34
Vertical Displacement at CG, Heave	17	23	29	35
Longitudinal Displacement at Sheave	18	24	30	36
Lateral Displacement at Sheave	19	25	31	37
Vertical Displacement at Sheave	20	26	32	38

B = Bretschneider LC = Long crested

J = JONSWAP SC = Short crested

TABLE 15 - MONOB I, 0, 3, AND 6 KNOT ROLL ANGLES FOR LONG CRESTED BRETSCHNEIDER SEAS

MONOB I

BRETSCHNEIDER LONG CRESTED, 1 FOOT SIGNIFICANT WAVE HEIGHT

RMS ROLL IN DEGREES/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3	.000/ 3.9	.003/ 3.9	.006/ 3.9	.007/ 3.5	.006/ 3.1	.005/ 4.5	.005/ 3.9	.003/ 3.1	.003/ 3.1	.005/ 3.5	.005/ 3.5	.003/ 3.9	.000/****
	4	.000/ 3.9	.010/ 5.2	.018/ 5.2	.024/ 5.2	.027/ 5.2	.029/ 5.2	.029/ 5.2	.026/ 5.2	.025/ 5.2	.021/ 5.2	.015/ 5.2	.008/ 5.7	.000/****
	5	.000/ 6.5	.025/ 6.5	.048/ 6.5	.067/ 6.3	.079/ 6.3	.085/ 6.5	.085/ 6.5	.082/ 6.5	.077/ 6.5	.066/ 6.5	.047/ 6.5	.025/ 6.5	.000/****
	6	.000/ 8.5	.095/ 8.5	.161/ 8.5	.204/ 8.5	.228/ 8.3	.240/ 8.3	.242/ 8.3	.238/ 8.3	.227/ 8.3	.203/ 8.5	.161/ 8.5	.095/ 8.5	.000/****
	7	.000/ 8.5	.194/ 8.5	.323/ 8.5	.399/ 8.5	.440/ 8.5	.458/ 8.5	.463/ 8.5	.458/ 8.5	.439/ 8.5	.399/ 8.5	.323/ 8.5	.195/ 8.5	.000/****
	8	.000/ 8.5	.255/ 8.5	.424/ 8.5	.523/ 8.5	.576/ 8.5	.600/ 8.5	.607/ 8.5	.600/ 8.5	.575/ 8.5	.523/ 8.5	.425/ 8.5	.256/ 9.5	.000/****
	9	.000/ 8.5	.272/ 8.5	.453/ 8.5	.561/ 8.5	.619/ 8.5	.646/ 8.5	.654/ 8.5	.646/ 8.5	.618/ 8.5	.561/ 8.5	.454/ 8.5	.272/ 8.5	.000/****
	10	.000/ 8.5	.263/ 8.5	.440/ 8.5	.545/ 8.5	.603/ 8.5	.631/ 8.5	.640/ 8.5	.631/ 8.5	.603/ 8.5	.545/ 8.5	.440/ 8.5	.263/ 8.5	.000/****
3	3	.000/ 5.2	.010/ 4.8	.012/ 4.8	.013/ 4.5	.009/ 3.9	.008/ 4.2	.005/ 3.9	.003/ 3.1	.002/ 3.1	.004/ 3.5	.003/ 3.7	.002/ 3.9	.000/****
	4	.000/ 5.2	.021/ 6.4	.037/ 6.3	.043/ 5.7	.042/ 5.7	.037/ 5.2	.029/ 5.2	.021/ 5.2	.016/ 5.2	.012/ 5.2	.008/ 5.7	.004/ 5.7	.000/****
	5	.000/ 8.5	.074/ 8.5	.110/ 8.3	.122/ 7.5	.116/ 6.8	.099/ 6.8	.081/ 6.5	.064/ 6.3	.051/ 6.3	.038/ 6.3	.025/ 6.5	.012/ 6.5	.000/****
	6	.000/ 8.5	.195/ 8.5	.265/ 8.5	.285/ 8.5	.268/ 8.5	.235/ 8.3	.199/ 8.3	.156/ 8.3	.125/ 8.3	.098/ 9.0	.065/ 9.0	.034/ 9.0	.000/****
	7	.000/ 8.5	.280/ 8.7	.387/ 8.5	.430/ 8.5	.426/ 8.5	.395/ 8.5	.355/ 8.5	.287/ 9.0	.244/ 9.0	.208/ 9.0	.150/ 9.0	.094/ 9.5	.000/****
	8	.000/ 8.5	.303/ 8.7	.429/ 8.5	.491/ 8.7	.507/ 8.7	.490/ 8.5	.460/ 8.5	.388/ 9.0	.347/ 9.0	.314/ 9.0	.241/ 9.5	.164/ 9.5	.000/****
	9	.000/ 8.5	.290/ 8.7	.418/ 8.7	.490/ 8.7	.519/ 8.7	.515/ 8.7	.498/ 8.5	.434/ 9.0	.400/ 9.0	.372/ 9.0	.295/ 9.5	.207/ 9.5	.000/****
	10	.000/ 8.5	.264/ 8.7	.385/ 8.7	.458/ 8.7	.493/ 8.7	.499/ 8.7	.491/ 9.0	.438/ 9.0	.410/ 9.0	.387/ 9.0	.311/ 9.5	.221/ 9.5	.000/****
6	3	.000/ 8.1	.036/ 7.7	.040/ 6.8	.038/ 5.7	.016/ 4.8	.011/ 4.5	.005/ 3.9	.003/ 3.1	.002/ 3.1	.002/ 3.5	.002/ 3.9	.001/ 3.9	.000/****
	4	.000/ 8.7	.139/ 8.5	.123/ 6.8	.096/ 7.0	.068/ 6.3	.046/ 5.7	.028/ 5.2	.016/ 5.2	.011/ 5.2	.008/ 5.7	.005/ 5.7	.003/ 3.9	.000/****
	5	.000/ 8.7	.306/ 8.5	.331/ 8.5	.252/ 8.3	.173/ 7.7	.114/ 6.8	.075/ 6.3	.051/ 6.3	.035/ 6.5	.024/ 6.3	.015/ 6.5	.007/ 6.5	.000/****
	6	.000/ 8.7	.386/ 8.7	.482/ 8.5	.425/ 8.5	.324/ 8.5	.230/ 8.3	.163/ 7.9	.115/ 7.9	.082/ 7.9	.058/ 7.9	.037/ 7.9	.018/ 7.9	.000/****
	7	.000/ 8.7	.377/ 8.7	.513/ 8.7	.504/ 8.7	.432/ 8.5	.344/ 8.5	.269/ 8.3	.205/ 9.0	.155/ 9.0	.120/ 9.5	.084/ 9.5	.045/ 9.8	.000/****
	8	.000/ 8.7	.335/ 8.7	.480/ 8.7	.505/ 8.7	.468/ 8.7	.406/ 8.7	.344/ 8.5	.284/ 9.0	.231/ 9.5	.193/ 9.5	.144/ 9.8	.085/10.5	.000/****
	9	.000/ 8.7	.289/ 8.7	.426/ 8.7	.469/ 8.7	.457/ 8.7	.419/ 8.7	.375/ 9.0	.328/ 9.0	.279/ 9.5	.243/ 9.8	.189/ 9.8	.116/10.5	.000/****
	10	.000/ 8.7	.247/ 8.7	.372/ 8.7	.421/ 8.7	.424/ 8.7	.403/ 8.7	.374/ 9.0	.339/ 9.0	.298/ 9.5	.265/ 9.8	.210/10.5	.132/10.5	.000/****

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 16 - MONOB I, 0, 3, AND 6 KNOT PITCH ANGLES FOR LONG CRESTED BRETSCHNEIDER SEAS

MONOB I

BRETSCHNEIDER LONG CRESTED, 1 FOOT SIGNIFICANT WAVE HEIGHT
RMS PITCH IN DEGREES/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3	.022/ 3.9	.023/ 3.9	.024/ 3.9	.025/ 4.5	.047/ 4.5	.055/ 3.9	.007/ 3.9	.049/ 3.9	.041/ 4.5	.022/ 4.5	.023/ 3.9	.024/ 3.9	.024/ 3.9
	4	.078/ 5.2	.084/ 5.2	.107/ 5.2	.150/ 4.8	.197/ 4.5	.170/ 4.5	.021/ 4.5	.145/ 4.5	.180/ 4.5	.143/ 4.8	.107/ 4.8	.086/ 5.2	.080/ 5.2
	5	.166/ 5.7	.175/ 5.7	.205/ 5.2	.253/ 5.2	.284/ 4.8	.219/ 4.8	.024/ 4.5	.188/ 4.8	.264/ 4.8	.244/ 5.2	.203/ 5.2	.176/ 5.7	.167/ 5.7
	6	.227/ 6.3	.234/ 6.3	.255/ 5.7	.285/ 5.2	.292/ 4.8	.212/ 4.8	.021/ 4.5	.184/ 4.8	.274/ 5.2	.277/ 5.2	.252/ 5.7	.233/ 6.3	.226/ 6.3
	7	.251/ 6.5	.255/ 6.5	.266/ 6.3	.279/ 5.7	.269/ 5.2	.186/ 4.8	.017/ 4.5	.165/ 4.8	.255/ 5.2	.272/ 5.7	.263/ 6.3	.253/ 6.5	.250/ 6.5
	8	.252/ 7.0	.253/ 7.0	.256/ 6.7	.257/ 6.3	.238/ 5.2	.160/ 4.8	.014/ 4.5	.143/ 5.2	.227/ 5.2	.252/ 6.3	.254/ 6.7	.251/ 7.0	.250/ 7.0
	9	.240/ 7.5	.240/ 7.3	.239/ 7.1	.232/ 6.5	.208/ 5.2	.136/ 4.8	.011/ 4.5	.123/ 5.2	.199/ 5.2	.228/ 6.5	.236/ 7.1	.238/ 7.5	.239/ 7.5
	10	.224/ 7.9	.223/ 7.9	.218/ 7.7	.208/ 7.1	.182/ 5.2	.117/ 4.8	.009/ 4.5	.107/ 5.2	.175/ 5.7	.205/ 7.1	.216/ 7.7	.221/ 7.9	.223/ 7.9
3	3	.029/ 5.2	.031/ 5.2	.034/ 4.5	.041/ 4.5	.083/ 4.5	.073/ 4.2	.006/ 4.5	.037/ 3.9	.023/ 4.5	.013/ 4.8	.013/ 3.9	.011/ 3.9	.011/ 3.9
	4	.075/ 5.2	.090/ 5.2	.097/ 6.3	.137/ 5.2	.223/ 4.8	.183/ 4.8	.021/ 4.5	.139/ 4.8	.153/ 4.8	.120/ 5.2	.090/ 5.2	.072/ 5.2	.067/ 5.2
	5	.137/ 6.8	.144/ 6.8	.168/ 6.4	.213/ 5.7	.277/ 5.2	.218/ 4.8	.028/ 4.8	.193/ 4.8	.256/ 5.2	.245/ 5.2	.216/ 5.7	.195/ 5.7	.188/ 5.7
	6	.187/ 7.3	.193/ 7.3	.210/ 7.0	.239/ 6.3	.273/ 5.2	.206/ 4.8	.026/ 4.8	.192/ 4.8	.280/ 5.2	.295/ 5.7	.285/ 5.7	.273/ 5.7	.268/ 6.3
	7	.212/ 7.9	.215/ 7.7	.224/ 7.3	.238/ 6.8	.248/ 5.7	.180/ 5.2	.022/ 4.8	.172/ 4.8	.264/ 5.2	.296/ 5.7	.300/ 6.3	.297/ 6.3	.295/ 6.3
	8	.217/ 8.3	.218/ 8.1	.221/ 7.9	.223/ 7.3	.220/ 6.3	.154/ 5.2	.018/ 4.8	.148/ 4.8	.237/ 5.2	.275/ 5.7	.288/ 6.3	.292/ 6.5	.292/ 6.7
	9	.211/ 8.7	.211/ 8.7	.209/ 8.3	.204/ 7.7	.193/ 6.4	.132/ 5.2	.015/ 4.8	.128/ 4.8	.209/ 5.2	.249/ 6.3	.266/ 6.7	.273/ 7.0	.275/ 7.0
	10	.200/ 9.2	.198/ 9.0	.194/ 8.7	.185/ 8.1	.169/ 7.1	.114/ 5.2	.012/ 4.8	.110/ 4.8	.183/ 5.7	.222/ 6.3	.242/ 7.0	.251/ 7.3	.254/ 7.5
6	3	.015/ 7.9	.020/ 7.7	.017/ 6.8	.028/ 5.7	.085/ 4.8	.095/ 4.2	.010/ 4.5	.029/ 4.5	.014/ 4.5	.009/ 3.5	.008/ 3.9	.007/ 3.9	.006/ 3.9
	4	.050/ 8.3	.054/ 8.1	.069/ 7.5	.168/ 6.5	.201/ 5.2	.203/ 4.5	.042/ 4.5	.137/ 4.8	.125/ 5.2	.090/ 5.2	.065/ 5.7	.052/ 5.7	.048/ 5.7
	5	.110/ 8.5	.116/ 8.5	.136/ 7.9	.174/ 7.0	.244/ 5.7	.224/ 4.8	.056/ 4.8	.204/ 4.8	.244/ 5.2	.229/ 5.7	.203/ 5.7	.184/ 6.3	.177/ 6.3
	6	.160/ 9.0	.165/ 8.7	.179/ 8.3	.203/ 7.5	.241/ 6.3	.206/ 5.2	.052/ 4.8	.206/ 5.2	.282/ 5.2	.300/ 5.7	.294/ 6.3	.284/ 6.3	.281/ 6.3
	7	.186/ 9.2	.189/ 9.2	.196/ 8.7	.207/ 7.9	.221/ 6.5	.179/ 5.2	.044/ 4.8	.185/ 5.2	.272/ 5.7	.310/ 5.7	.321/ 6.3	.321/ 6.3	.321/ 6.3
	8	.194/ 9.8	.195/ 9.5	.197/ 9.2	.198/ 8.3	.198/ 7.1	.153/ 5.2	.036/ 4.8	.159/ 5.2	.246/ 5.7	.291/ 5.7	.312/ 6.3	.319/ 6.5	.321/ 6.5
	9	.192/10.1	.191/ 9.8	.189/ 9.5	.184/ 8.7	.175/ 7.5	.131/ 5.7	.030/ 4.8	.136/ 5.2	.217/ 5.7	.264/ 6.3	.289/ 6.3	.300/ 6.7	.303/ 6.7
	10	.183/10.5	.182/10.5	.178/ 9.8	.169/ 9.2	.155/ 7.9	.113/ 5.7	.025/ 4.8	.117/ 5.2	.190/ 5.7	.236/ 6.3	.262/ 6.5	.275/ 7.0	.279/ 7.0

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 17 - MONOB I, 0, 3, AND 6 KNOT VERTICAL DISPLACEMENTS AT THE CG (HEAVE) FOR LONG CRESTED BRETSCHNEIDER SEAS

MONOB I

BRETSCHNEIDER LONG CRESTED, 1 FOOT SIGNIFICANT WAVE HEIGHT

RMS VER DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3	.006/ 4.5	.006/ 4.5	.007/ 4.5	.009/ 3.9	.010/ 4.5	.026/ 4.5	.040/ 3.9	.028/ 4.5	.011/ 4.5	.010/ 3.9	.008/ 4.5	.007/ 4.5	.006/ 4.5
	4	.030/ 4.5	.030/ 4.5	.028/ 4.5	.033/ 5.2	.068/ 4.8	.130/ 4.8	.168/ 4.8	.140/ 4.8	.081/ 4.8	.041/ 5.2	.031/ 4.5	.032/ 4.5	.033/ 4.5
	5	.052/ 4.8	.053/ 6.3	.060/ 6.3	.082/ 5.7	.137/ 5.2	.213/ 5.2	.257/ 4.8	.226/ 4.8	.152/ 5.2	.092/ 5.7	.065/ 6.3	.058/ 6.3	.057/ 4.5
	6	.085/ 7.0	.089/ 7.0	.102/ 7.0	.129/ 6.5	.181/ 6.3	.248/ 5.2	.285/ 5.2	.257/ 5.2	.193/ 6.3	.137/ 6.5	.106/ 7.0	.093/ 7.0	.089/ 7.0
	7	.121/ 7.9	.125/ 7.9	.139/ 7.7	.164/ 7.3	.207/ 7.1	.259/ 6.7	.287/ 6.3	.265/ 6.5	.215/ 7.0	.170/ 7.3	.142/ 7.7	.128/ 7.7	.124/ 7.9
	8	.151/ 8.5	.155/ 8.5	.167/ 8.3	.189/ 8.3	.222/ 8.1	.261/ 7.9	.282/ 7.7	.265/ 7.9	.227/ 8.1	.192/ 8.3	.170/ 8.3	.157/ 8.5	.154/ 8.5
	9	.175/ 9.5	.178/ 9.5	.188/ 9.5	.205/ 9.0	.231/ 9.0	.260/ 9.0	.275/ 9.0	.263/ 9.0	.234/ 9.0	.208/ 9.0	.190/ 9.5	.180/ 9.5	.176/ 9.5
	10	.192/10.5	.195/10.5	.203/10.5	.217/10.5	.237/ 9.8	.259/ 9.8	.270/ 9.8	.261/ 9.8	.239/ 9.8	.219/10.5	.204/10.5	.196/10.5	.193/10.5
3	3	.006/ 4.8	.007/ 4.8	.011/ 4.8	.015/ 4.8	.011/ 3.9	.032/ 4.2	.040/ 3.9	.021/ 4.5	.009/ 4.8	.006/ 3.9	.005/ 4.5	.003/ 4.5	.003/ 4.5
	4	.019/ 5.7	.020/ 5.7	.025/ 5.2	.038/ 6.3	.066/ 5.2	.132/ 4.8	.167/ 4.8	.134/ 4.8	.082/ 5.2	.045/ 5.2	.028/ 5.7	.023/ 5.7	.021/ 5.7
	5	.040/ 7.5	.043/ 7.5	.053/ 7.1	.078/ 6.7	.127/ 5.7	.206/ 5.2	.255/ 4.8	.230/ 5.2	.168/ 5.2	.114/ 5.7	.081/ 5.7	.066/ 5.7	.061/ 6.3
	6	.076/ 8.3	.080/ 8.1	.094/ 7.9	.121/ 7.3	.169/ 6.8	.237/ 5.7	.283/ 5.2	.267/ 5.2	.215/ 5.7	.165/ 6.3	.130/ 6.5	.112/ 6.7	.106/ 7.0
	7	.113/ 9.0	.117/ 8.7	.130/ 8.5	.155/ 8.3	.195/ 7.7	.248/ 7.1	.286/ 6.3	.276/ 6.3	.236/ 7.0	.195/ 7.1	.165/ 7.5	.148/ 7.7	.143/ 7.7
	8	.144/ 9.5	.147/ 9.5	.159/ 9.2	.180/ 9.0	.211/ 8.7	.252/ 8.1	.281/ 7.7	.274/ 7.9	.245/ 7.9	.213/ 8.1	.189/ 8.3	.175/ 8.3	.170/ 8.5
	9	.168/10.5	.171/10.5	.181/10.1	.197/ 9.8	.222/ 9.5	.253/ 9.2	.275/ 9.0	.271/ 9.0	.249/ 9.0	.225/ 9.0	.206/ 9.0	.194/ 9.5	.190/ 9.5
	10	.186/11.6	.188/11.2	.196/11.2	.210/11.2	.229/10.5	.253/10.1	.269/ 9.8	.267/ 9.8	.251/ 9.8	.232/10.5	.217/10.5	.208/10.5	.205/10.5
6	3	.004/ 7.9	.004/ 7.7	.006/ 6.8	.007/ 5.7	.018/ 4.8	.039/ 4.5	.041/ 3.9	.017/ 4.5	.006/ 4.8	.004/ 3.9	.002/ 4.5	.002/ 4.5	.002/ 4.5
	4	.013/ 7.9	.014/ 7.7	.018/ 6.8	.029/ 7.0	.072/ 5.7	.133/ 5.2	.167/ 4.5	.127/ 4.8	.074/ 5.2	.041/ 5.7	.026/ 5.7	.020/ 5.7	.018/ 5.7
	5	.036/ 9.0	.038/ 9.0	.048/ 8.5	.071/ 7.7	.121/ 6.7	.198/ 5.7	.252/ 4.8	.232/ 5.2	.177/ 5.7	.132/ 5.7	.101/ 6.3	.084/ 6.3	.079/ 6.3
	6	.072/ 9.8	.076/ 9.5	.088/ 9.0	.113/ 8.3	.159/ 7.5	.226/ 6.3	.280/ 5.2	.275/ 5.2	.236/ 5.7	.196/ 6.3	.165/ 6.3	.147/ 6.3	.141/ 6.3
	7	.108/10.1	.112/10.1	.124/ 9.8	.147/ 9.0	.185/ 8.3	.239/ 7.5	.283/ 6.3	.285/ 5.7	.258/ 5.7	.228/ 6.3	.202/ 6.3	.186/ 6.5	.181/ 6.5
	8	.139/10.8	.142/10.8	.153/10.5	.173/ 9.8	.203/ 9.2	.244/ 8.5	.278/ 7.9	.283/ 7.7	.265/ 7.9	.242/ 7.9	.221/ 8.1	.208/ 8.3	.204/ 8.3
	9	.163/12.1	.166/11.6	.175/11.2	.191/10.8	.215/10.1	.246/ 9.5	.273/ 9.0	.278/ 9.0	.265/ 9.0	.248/ 9.0	.232/ 9.0	.222/ 9.0	.218/ 9.0
	10	.181/12.8	.184/12.6	.191/12.1	.205/11.6	.224/10.8	.248/10.5	.268/ 9.8	.273/ 9.8	.263/ 9.8	.250/10.5	.238/10.5	.230/10.5	.227/10.5

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 18 - MONOB I, 0, 3, AND 6 KNOT LONGITUDINAL DISPLACEMENTS AT THE CABLE SHEAVE FOR LONG CRESTED BRETSCHNEIDER SEAS

MONOB I

BRETSCHNEIDER LONG CRESTED, 1 FOOT SIGNIFICANT WAVE HEIGHT

RMS LON DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

CABLE SHEAVE - 39.25 FT AFT OF FP, 18.7 FT TO PORT OF CL, AND 24.9 FT ABOVE BL

V	T_0	0	15	30	45	60	75	90	105	120	135	150	165	180
		SHIP HEADING ANGLE IN DEGREES												
0	3	.004/ 3.9	.004/ 3.9	.005/ 3.9	.004/ 3.5	.006/ 3.9	.008/ 3.9	.002/ 3.9	.008/ 3.5	.005/ 3.9	.002/ 3.5	.003/ 3.9	.004/ 3.9	.005/ 3.9
	4	.012/ 5.7	.013/ 5.7	.015/ 5.2	.019/ 5.2	.024/ 4.8	.022/ 4.8	.009/ 5.2	.014/ 3.9	.015/ 4.5	.011/ 5.2	.010/ 5.2	.011/ 5.7	.013/ 5.7
	5	.033/ 6.3	.037/ 6.3	.034/ 5.7	.05[illegible]/ 6.3	.052/ 5.7	.043/ 5.7	.023/ 6.3	.018/ 4.5	.022/ 5.2	.022/ 5.7	.024/ 6.3	.029/ 6.3	.036/ 6.3
	6	.064/ 7.0	.076/ 7.1	.065/ 8.3	.099/ 8.3	.097/ 8.3	.083/ 8.3	.063/ 8.3	.052/ 8.5	.048/ 8.5	.046/ 8.5	.045/ 8.5	.050/ 7.0	.066/ 7.0
	7	.092/ 7.9	.114/ 8.3	.103/ 8.5	.152/ 8.3	.149/ 8.3	.135/ 8.5	.119/ 8.5	.109/ 8.5	.103/ 8.5	.096/ 9.0	.084/ 9.0	.076/ 9.0	.093/ 7.9
	8	.116/ 8.5	.134/ 8.5	.125/ 8.5	.180/ 8.5	.177/ 8.5	.166/ 8.5	.156/ 8.5	.151/ 8.5	.148/ 9.0	.141/ 9.0	.125/ 9.0	.107/ 9.0	.116/ 8.5
	9	.134/ 9.5	.139/ 8.5	.128/ 8.5	.184/ 8.5	.180/ 8.5	.173/ 8.5	.168/ 8.5	.169/ 9.0	.171/ 9.0	.167/ 9.0	.153/ 9.0	.133/ 9.0	.134/ 9.5
	10	.148/10.5	.137/ 8.5	.121/ 8.5	.176/ 8.5	.171/ 8.5	.165/ 8.5	.164/ 8.5	.171/ 9.0	.178/ 9.0	.179/ 9.0	.169/ 9.0	.151/ 9.0	.147/10.5
3	3	.006/ 5.2	.007/ 5.2	.008/ 4.8	.007/ 4.5	.006/ 4.5	.009/ 3.9	.002/ 3.9	.007/ 3.5	.005/ 3.9	.002/ 3.9	.002/ 3.9	.003/ 3.9	.003/ 3.9
	4	.017/ 6.7	.021/ 6.7	.026/ 6.4	.028/ 5.7	.030/ 5.7	.025/ 5.2	.009/ 4.8	.013/ 3.9	.014/ 4.5	.010/ 4.8	.008/ 5.2	.008/ 5.7	.009/ 5.7
	5	.047/ 7.3	.060/ 7.3	.070/ 7.1	.064/ 6.4	.067/ 6.5	.048/ 6.3	.023/ 6.3	.017/ 4.5	.021/ 5.2	.021/ 5.7	.021/ 6.3	.023/ 6.3	.027/ 6.3
	6	.086/ 8.1	.113/ 8.5	.126/ 8.3	.106/ 8.3	.112/ 8.1	.083/ 8.1	.053/ 8.3	.033/ 8.5	.030/ 9.0	.032/ 6.5	.036/ 7.0	.042/ 7.0	.051/ 7.0
	7	.121/ 8.7	.147/ 8.5	.158/ 8.5	.133/ 8.5	.146/ 8.3	.120/ 8.5	.093/ 8.5	.068/ 9.0	.059/ 9.0	.057/ 9.5	.058/ 9.5	.065/ 9.5	.074/ 7.9
	8	.148/ 9.5	.163/ 8.5	.164/ 8.5	.139/ 8.5	.157/ 8.5	.138/ 8.5	.120/ 8.5	.100/ 9.0	.095/ 9.0	.095/ 9.5	.092/ 9.8	.095/ 9.8	.093/ 9.0
	9	.168/10.1	.172/ 8.5	.159/ 8.5	.131/ 8.5	.152/ 8.5	.139/ 8.5	.129/ 8.5	.119/ 9.0	.121/ 9.0	.125/ 9.5	.121/ 9.8	.121/ 9.8	.109/ 9.5
	10	.183/11.2	.178/ 8.5	.152/ 8.5	.119/ 8.5	.141/ 8.5	.130/ 8.5	.128/ 9.0	.126/ 9.0	.134/ 9.5	.143/ 9.8	.141/ 9.8	.139/ 9.8	.122/10.5
6	3	.013/ 7.9	.020/ 7.7	.018/ 6.8	.012/ 5.7	.009/ 5.2	.009/ 4.2	.002/ 3.9	.007/ 3.5	.004/ 3.9	.002/ 4.5	.001/ 3.9	.002/ 3.9	.002/ 3.9
	4	.033/ 7.9	.057/ 7.7	.056/ 6.8	.049/ 7.0	.042/ 6.3	.021/ 5.2	.009/ 4.8	.013/ 3.9	.013/ 4.5	.010/ 5.2	.007/ 5.2	.006/ 5.7	.007/ 5.7
	5	.072/ 9.0	.116/ 8.5	.128/ 8.3	.113/ 7.9	.086/ 7.0	.037/ 6.8	.022/ 6.3	.016/ 4.5	.021/ 5.2	.020/ 5.7	.019/ 5.7	.019/ 6.3	.022/ 6.3
	6	.123/ 9.2	.149/ 8.5	.171/ 8.5	.161/ 8.3	.126/ 8.1	.063/ 8.1	.044/ 7.9	.026/ 8.3	.026/ 6.3	.029/ 6.7	.031/ 7.0	.035/ 7.0	.041/ 7.1
	7	.166/ 9.8	.169/ 8.5	.181/ 8.5	.174/ 8.3	.143/ 8.3	.088/ 8.5	.072/ 8.3	.049/ 9.0	.042/ 9.5	.041/ 9.8	.043/ 7.7	.050/ 7.9	.060/ 8.1
	8	.197/10.5	.185/ 8.5	.181/ 8.5	.169/ 8.5	.142/ 8.5	.100/ 8.5	.091/ 8.5	.075/ 9.0	.067/ 9.8	.062/ 9.8	.060/10.5	.066/10.5	.077/ 9.0
	9	.219/11.2	.199/11.6	.181/ 8.5	.160/ 8.5	.131/ 8.5	.100/ 8.7	.099/ 9.0	.092/ 9.5	.089/ 9.8	.086/10.5	.081/10.5	.084/10.5	.091/ 9.8
	10	.233/12.1	.210/12.1	.184/ 8.5	.154/ 8.5	.118/ 8.5	.095/ 8.7	.099/ 9.0	.101/ 9.5	.104/ 9.8	.104/10.5	.101/10.5	.101/10.5	.103/10.5

[illegible] MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 19 - MONOB I, 0, 3, AND 6 KNOT LATERAL DISPLACEMENTS AT THE CABLE SHEAVE FOR LONG CRESTED BRETSCHNEIDER SEAS

MONOB I

BRETSCHNEIDER LONG CRESTED, 1 FOOT SIGNIFICANT WAVE HEIGHT

RMS LAT DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

CABLE SHEAVE - 39.25 FT AFT OF FP, 18.7 FT TO PORT OF CL, AND 24.9 FT ABOVE BL

V	T_0	0	15	30	45	60	75	90	105	120	135	150	165	180
		SHIP HEADING ANGLE IN DEGREES												
0	3	.000/ 3.9	.003/ 3.9	.006/ 3.9	.009/ 3.5	.027/ 3.9	.042/ 3.5	.044/ 3.5	.031/ 3.5	.018/ 3.9	.009/ 3.5	.005/ 3.5	.003/ 3.9	.000/****
	4	.000/ 5.2	.009/ 5.2	.021/ 5.2	.039/ 4.8	.069/ 4.8	.097/ 4.5	.092/ 4.5	.082/ 4.5	.064/ 4.8	.039/ 4.8	.022/ 5.2	.010/ 5.2	.000/****
	5	.000/ 6.3	.023/ 6.3	.050/ 5.7	.084/ 5.7	.121/ 5.7	.147/ 5.7	.143/ 5.7	.132/ 5.7	.113/ 5.7	.082/ 5.7	.051/ 5.7	.024/ 5.7	.000/****
	6	.000/ 8.5	.048/ 8.5	.094/ 8.3	.138/ 8.3	.178/ 7.0	.200/ 7.0	.197/ 7.0	.185/ 7.0	.163/ 7.0	.128/ 7.0	.089/ 8.3	.047/ 8.3	.000/****
	7	.000/ 8.5	.077/ 8.5	.143/ 8.5	.196/ 8.3	.235/ 8.3	.254/ 8.3	.250/ 8.3	.234/ 8.3	.209/ 8.3	.172/ 8.3	.127/ 8.3	.073/ 8.5	.000/****
	8	.000/ 8.5	.094/ 8.5	.170/ 8.5	.226/ 8.5	.263/ 8.3	.279/ 8.3	.273/ 8.3	.255/ 8.3	.229/ 8.3	.192/ 8.3	.147/ 8.5	.087/ 8.5	.000/****
	9	.000/ 8.5	.097/ 8.5	.174/ 8.5	.230/ 8.5	.265/ 8.5	.278/ 8.3	.272/ 8.3	.254/ 8.3	.228/ 8.3	.193/ 8.3	.149/ 8.5	.089/ 8.5	.000/****
	10	.000/ 8.5	.093/ 8.5	.168/ 8.5	.221/ 8.5	.254/ 8.5	.266/ 8.3	.260/ 8.3	.243/ 8.3	.218/ 8.3	.185/ 8.3	.143/ 8.5	.086/ 8.5	.000/****
3	3	.000/ 5.2	.004/ 4.5	.009/ 4.8	.012/ 4.5	.024/ 4.5	.047/ 3.7	.042/ 3.5	.029/ 3.5	.016/ 3.9	.007/ 4.5	.003/ 3.5	.002/ 3.9	.000/****
	4	.000/ 6.5	.013/ 6.5	.029/ 6.3	.050/ 5.7	.082/ 5.2	.105/ 4.8	.091/ 4.5	.077/ 4.5	.056/ 4.8	.032/ 4.8	.017/ 5.2	.007/ 5.2	.000/****
	5	.000/ 8.5	.038/ 8.5	.073/ 7.0	.109/ 6.5	.143/ 6.3	.158/ 5.7	.141/ 5.7	.123/ 5.7	.099/ 5.7	.068/ 5.7	.041/ 5.7	.019/ 6.3	.000/****
	6	.000/ 8.5	.077/ 8.5	.130/ 8.5	.173/ 8.3	.201/ 7.7	.208/ 7.0	.190/ 6.7	.166/ 6.7	.138/ 6.7	.103/ 6.7	.066/ 6.7	.032/ 7.0	.000/****
	7	.000/ 8.5	.102/ 8.5	.167/ 8.5	.215/ 8.5	.242/ 8.3	.246/ 8.1	.229/ 8.1	.200/ 8.1	.169/ 8.1	.132/ 8.3	.089/ 9.0	.046/ 9.0	.000/****
	8	.000/ 8.5	.107/ 8.5	.176/ 8.5	.226/ 8.5	.254/ 8.5	.259/ 8.3	.244/ 8.3	.214/ 8.3	.183/ 8.5	.148/ 9.0	.102/ 9.0	.056/ 9.0	.000/****
	9	.000/ 8.5	.103/ 8.5	.170/ 8.5	.219/ 8.5	.247/ 8.5	.254/ 8.3	.241/ 8.3	.213/ 8.3	.184/ 8.5	.150/ 9.0	.106/ 9.0	.061/ 9.0	.000/****
	10	.000/ 8.5	.095/ 8.5	.159/ 8.5	.207/ 8.5	.235/ 8.5	.243/ 8.5	.232/ 8.3	.207/ 8.5	.179/ 9.0	.147/ 9.0	.104/ 9.0	.061/ 9.0	.000/****
6	3	.000/ 8.1	.012/ 7.7	.016/ 6.8	.017/ 5.7	.029/ 5.2	.053/ 4.2	.040/ 3.5	.027/ 3.5	.014/ 3.9	.006/ 4.5	.002/ 3.5	.001/ 3.9	.000/****
	4	.000/ 8.7	.042/ 8.5	.055/ 7.7	.071/ 6.8	.099/ 5.7	.113/ 5.2	.090/ 4.5	.072/ 4.5	.050/ 4.8	.027/ 4.8	.014/ 5.2	.006/ 5.2	.000/****
	5	.000/ 8.7	.103/ 8.5	.141/ 8.5	.157/ 7.7	.172/ 6.7	.168/ 6.3	.139/ 5.7	.115/ 5.7	.088/ 5.7	.058/ 5.7	.034/ 5.7	.015/ 6.3	.000/****
	6	.000/ 8.7	.130/ 8.5	.196/ 8.5	.223/ 8.3	.229/ 7.9	.214/ 7.1	.182/ 6.7	.153/ 6.5	.121/ 6.7	.087/ 6.7	.055/ 7.0	.026/ 7.0	.000/****
	7	.000/ 8.7	.128/ 8.7	.205/ 8.5	.244/ 8.5	.255/ 8.3	.241/ 8.1	.213/ 7.7	.182/ 7.7	.148/ 7.9	.112/ 7.9	.074/ 7.9	.037/ 7.9	.000/****
	8	.000/ 8.7	.117/ 8.7	.194/ 8.5	.238/ 8.5	.254/ 8.5	.247/ 8.3	.224/ 8.1	.196/ 8.3	.163/ 8.5	.128/ 9.0	.089/ 9.0	.047/ 9.5	.000/****
	9	.000/ 8.7	.104/ 8.7	.178/ 8.5	.223/ 8.5	.243/ 8.5	.240/ 8.3	.222/ 8.3	.197/ 8.5	.167/ 9.0	.134/ 9.0	.096/ 9.5	.052/ 9.5	.000/****
	10	.000/ 8.7	.094/ 8.7	.164/ 8.5	.209/ 8.7	.230/ 8.5	.231/ 8.5	.217/ 8.3	.194/ 8.5	.166/ 9.0	.134/ 9.0	.097/ 9.5	.054/ 9.5	.000/****

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 20 - MONOB I, 0, 3, AND 6 KNOT VERTICAL DISPLACEMENTS AT THE CABLE SHEAVE FOR LONG CRESTED BRETSCHNEIDER SEAS

MONOB I

BRETSCHNEIDER LONG CRESTED, 1 FOOT SIGNIFICANT WAVE HEIGHT
RMS VER DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS
CABLE SHEAVE - 39.25 FT AFT OF FP, 18.7 FT TO PORT OF CL, AND 24.9 FT ABOVE BL

V	T_0	0	15	30	45	60	75	90	105	120	135	150	165	180
		SHIP HEADING ANGLE IN DEGREES												
0	3	.021/ 3.9	.022/ 3.9	.025/ 3.9	.029/ 4.5	.045/ 3.9	.059/ 3.9	.046/ 3.9	.047/ 3.9	.030/ 4.5	.016/ 4.5	.020/ 3.9	.020/ 3.9	.020/ 3.9
	4	.078/ 5.2	.083/ 4.8	.101/ 4.8	.132/ 4.8	.176/ 4.5	.197/ 4.5	.181/ 4.5	.188/ 4.5	.161/ 4.8	.110/ 4.8	.079/ 5.2	.068/ 5.2	.064/ 5.2
	5	.150/ 5.7	.153/ 5.7	.175/ 5.2	.215/ 5.2	.262/ 4.8	.282/ 4.8	.273/ 4.8	.284/ 4.8	.262/ 4.8	.211/ 5.2	.167/ 5.7	.142/ 5.7	.131/ 5.7
	6	.204/ 6.3	.201/ 6.3	.220/ 5.7	.256/ 5.7	.297/ 5.2	.317/ 5.2	.318/ 5.2	.331/ 5.2	.320/ 5.7	.283/ 6.3	.243/ 6.3	.211/ 6.3	.188/ 6.3
	7	.236/ 7.0	.232/ 6.7	.260/ 8.5	.299/ 8.5	.337/ 8.5	.359/ 8.5	.367/ 8.5	.379/ 8.5	.373/ 8.3	.345/ 8.3	.306/ 8.3	.263/ 8.3	.224/ 7.0
	8	.252/ 7.9	.254/ 9.0	.294/ 9.0	.337/ 8.5	.373/ 8.5	.394/ 8.5	.403/ 8.5	.411/ 8.5	.404/ 8.5	.378/ 8.5	.339/ 8.5	.289/ 8.5	.243/ 7.9
	9	.259/ 9.0	.268/ 9.0	.312/ 9.0	.354/ 9.0	.386/ 8.5	.405/ 8.5	.412/ 8.5	.415/ 8.5	.406/ 8.5	.381/ 8.5	.344/ 8.5	.295/ 8.5	.253/ 9.0
	10	.262/ 9.8	.274/ 9.0	.316/ 9.0	.354/ 9.0	.382/ 9.0	.397/ 8.5	.401/ 8.5	.402/ 8.5	.391/ 8.5	.368/ 8.5	.334/ 8.5	.291/ 8.5	.257/ 9.8
3	3	.040/ 4.8	.035/ 4.8	.035/ 4.5	.047/ 4.5	.070/ 4.5	.073/ 4.2	.044/ 4.5	.034/ 4.5	.017/ 4.5	.011/ 4.8	.012/ 3.9	.009/ 3.9	.013/ 3.9
	4	.065/ 5.2	.067/ 5.2	.083/ 5.2	.118/ 5.2	.180/ 4.8	.205/ 4.8	.189/ 4.8	.182/ 4.8	.143/ 4.8	.096/ 5.2	.067/ 5.2	.053/ 5.2	.050/ 5.2
	5	.114/ 7.0	.111/ 6.8	.128/ 6.4	.169/ 5.7	.237/ 5.2	.279/ 5.2	.289/ 4.8	.295/ 4.8	.262/ 5.2	.211/ 5.2	.169/ 5.7	.145/ 5.7	.136/ 5.7
	6	.162/ 7.5	.169/ 8.7	.190/ 8.5	.224/ 8.5	.276/ 8.5	.314/ 5.2	.330/ 5.2	.339/ 5.2	.319/ 5.2	.280/ 5.7	.243/ 6.3	.218/ 6.3	.205/ 6.3
	7	.197/ 8.3	.225/ 8.7	.258/ 8.7	.289/ 8.7	.326/ 8.5	.352/ 8.5	.362/ 8.3	.365/ 8.3	.351/ 8.5	.322/ 7.0	.290/ 7.0	.262/ 7.0	.244/ 7.0
	8	.219/ 9.0	.258/ 8.7	.297/ 8.7	.329/ 8.7	.359/ 8.7	.379/ 8.7	.385/ 8.5	.382/ 9.0	.371/ 9.0	.348/ 9.0	.317/ 9.0	.287/ 9.0	.262/ 7.9
	9	.232/10.1	.272/ 8.7	.310/ 8.7	.342/ 8.7	.369/ 8.7	.384/ 8.7	.389/ 8.5	.384/ 9.0	.374/ 9.0	.356/ 9.0	.327/ 9.0	.296/ 9.0	.270/ 9.0
	10	.241/10.8	.276/ 8.7	.311/ 8.7	.339/ 8.7	.363/ 8.7	.376/ 8.7	.380/ 9.0	.374/ 9.0	.366/ 9.0	.351/ 9.0	.325/ 9.0	.296/ 9.0	.272/ 9.8
6	3	.017/ 7.9	.015/ 7.7	.018/ 6.8	.034/ 5.7	.093/ 4.8	.084/ 4.2	.044/ 4.5	.025/ 4.5	.012/ 4.8	.007/ 3.9	.007/ 3.9	.007/ 3.9	.006/ 3.9
	4	.042/ 7.9	.045/ 7.7	.051/ 7.0	.078/ 6.3	.142/ 5.7	.206/ 4.8	.198/ 4.5	.175/ 4.8	.122/ 5.2	.078/ 5.2	.054/ 5.7	.043/ 5.7	.040/ 5.7
	5	.090/ 8.7	.129/ 8.7	.135/ 8.7	.140/ 8.3	.197/ 6.3	.273/ 5.2	.302/ 4.8	.305/ 5.2	.262/ 5.2	.213/ 5.7	.174/ 5.7	.151/ 6.3	.142/ 6.3
	6	.138/ 9.2	.204/ 8.7	.234/ 8.7	.236/ 8.7	.260/ 8.5	.309/ 5.7	.340/ 5.2	.353/ 5.2	.331/ 5.7	.295/ 5.7	.262/ 6.3	.238/ 6.3	.228/ 6.3
	7	.175/ 9.8	.242/ 8.7	.287/ 9.0	.302/ 8.7	.316/ 8.7	.342/ 8.5	.360/ 8.3	.370/ 5.2	.357/ 5.7	.333/ 5.7	.306/ 6.3	.284/ 6.3	.272/ 6.3
	8	.200/10.5	.258/ 8.7	.304/ 9.0	.328/ 9.0	.344/ 8.7	.361/ 8.7	.372/ 8.5	.378/ 9.0	.369/ 9.0	.351/ 9.0	.328/ 7.9	.306/ 7.7	.288/ 7.5
	9	.216/11.2	.263/ 8.7	.305/ 9.0	.331/ 9.0	.348/ 9.0	.363/ 8.7	.372/ 9.0	.377/ 9.0	.370/ 9.0	.357/ 9.5	.337/ 9.5	.313/ 9.5	.293/ 9.0
	10	.227/12.1	.264/11.6	.300/ 9.0	.325/ 9.0	.341/ 9.0	.355/ 9.0	.363/ 9.0	.367/ 9.0	.363/ 9.5	.353/ 9.5	.335/ 9.8	.312/ 9.8	.291/ 9.8

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 21 - MONOB I, 0, 3, AND 6 KNOT ROLL ANGLES FOR SHORT CRESTED BRETSCHNEIDER SEAS

MONOB I

BRETSCHNEIDER SHORT CRESTED, 1 FOOT SIGNIFICANT WAVE HEIGHT
RMS ROLL IN DEGREES/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

V	T_0	0	15	30	45	60	75	90	105	120	135	150	165	180
		SHIP HEADING ANGLE IN DEGREES												
0	3	.005/ 3.5	.005/ 3.5	.005/ 3.5	.005/ 3.5	.005/ 3.5	.005/ 3.5	.005/ 3.1	.005/ 3.1	.004/ 3.5	.004/ 3.5	.004/ 3.5	.004/ 3.5	.004/ 3.5
	4	.017/ 5.2	.018/ 5.2	.020/ 5.2	.022/ 5.2	.024/ 5.2	.025/ 5.2	.026/ 5.2	.025/ 5.2	.023/ 5.2	.020/ 5.2	.018/ 5.2	.016/ 5.2	.015/ 5.2
	5	.047/ 6.5	.050/ 6.5	.056/ 6.5	.064/ 6.5	.071/ 6.5	.075/ 6.5	.076/ 6.5	.075/ 6.5	.070/ 6.5	.063/ 6.5	.055/ 6.5	.049/ 6.5	.046/ 6.5
	6	.148/ 8.5	.154/ 8.5	.170/ 8.5	.189/ 8.5	.207/ 8.3	.219/ 8.3	.223/ 8.3	.219/ 8.3	.207/ 8.3	.189/ 8.5	.169/ 8.5	.154/ 8.5	.147/ 8.5
	7	.292/ 8.5	.303/ 8.5	.332/ 8.5	.368/ 8.5	.401/ 8.5	.423/ 8.5	.431/ 8.5	.423/ 8.5	.400/ 8.5	.368/ 8.5	.332/ 8.5	.303/ 8.5	.292/ 8.5
	8	.383/ 8.5	.398/ 8.5	.435/ 8.5	.482/ 8.5	.525/ 8.5	.554/ 8.5	.564/ 8.5	.554/ 8.5	.525/ 8.5	.482/ 8.5	.435/ 8.5	.398/ 8.5	.383/ 8.5
	9	.410/ 8.5	.426/ 8.5	.467/ 8.5	.518/ 8.5	.564/ 8.5	.595/ 8.5	.606/ 8.5	.595/ 8.5	.564/ 8.5	.518/ 8.5	.467/ 8.5	.426/ 8.5	.410/ 8.5
	10	.398/ 8.5	.414/ 8.5	.454/ 8.5	.504/ 8.5	.550/ 8.5	.581/ 8.5	.592/ 8.5	.581/ 8.5	.550/ 8.5	.504/ 8.5	.455/ 8.5	.414/ 8.5	.398/ 8.5
3	3	.010/ 4.5	.010/ 4.5	.010/ 4.5	.010/ 4.5	.009/ 4.5	.008/ 4.5	.007/ 4.5	.006/ 4.2	.004/ 4.2	.003/ 3.1	.003/ 3.5	.002/ 3.5	.002/ 3.5
	4	.031/ 6.3	.032/ 5.7	.033/ 5.7	.034/ 5.7	.034/ 5.7	.033/ 5.7	.030/ 5.7	.026/ 5.2	.021/ 5.2	.017/ 5.2	.013/ 5.2	.010/ 5.2	.009/ 5.2
	5	.093/ 8.5	.093/ 8.5	.096/ 8.5	.097/ 8.3	.097/ 7.1	.093/ 7.0	.085/ 6.8	.074/ 6.7	.061/ 6.5	.049/ 6.5	.038/ 6.3	.030/ 6.3	.027/ 6.3
	6	.224/ 8.5	.226/ 8.5	.230/ 8.5	.233/ 8.5	.231/ 8.5	.221/ 8.5	.202/ 8.5	.177/ 8.3	.148/ 8.3	.120/ 8.3	.095/ 8.3	.077/ 8.5	.070/ 9.0
	7	.334/ 8.5	.338/ 8.5	.350/ 8.5	.362/ 8.5	.367/ 8.5	.360/ 8.5	.339/ 8.5	.307/ 8.5	.267/ 8.5	.226/ 9.0	.188/ 9.0	.160/ 9.0	.150/ 9.0
	8	.376/ 8.7	.384/ 8.7	.404/ 8.7	.426/ 8.7	.441/ 8.7	.442/ 8.7	.428/ 8.7	.398/ 8.7	.358/ 9.0	.314/ 9.0	.272/ 9.0	.241/ 9.0	.230/ 9.0
	9	.372/ 8.7	.382/ 8.7	.406/ 8.7	.434/ 8.7	.456/ 8.7	.465/ 8.7	.458/ 8.7	.434/ 9.0	.399/ 9.0	.358/ 9.0	.317/ 9.0	.286/ 9.0	.275/ 9.5
	10	.346/ 8.7	.356/ 8.7	.382/ 8.7	.413/ 8.7	.438/ 8.7	.451/ 8.7	.449/ 8.7	.432/ 9.0	.402/ 9.0	.364/ 9.0	.326/ 9.0	.298/ 9.5	.287/ 9.5
6	3	.033/ 7.7	.032/ 7.7	.031/ 7.7	.028/ 7.7	.025/ 7.7	.021/ 6.8	.016/ 6.8	.011/ 5.7	.007/ 5.7	.004/ 4.8	.002/ 3.1	.002/ 3.5	.002/ 3.5
	4	.108/ 7.7	.106/ 7.7	.100/ 7.7	.091/ 7.7	.080/ 7.7	.067/ 7.7	.052/ 6.8	.037/ 6.8	.025/ 5.7	.016/ 5.7	.010/ 5.2	.007/ 5.2	.006/ 5.2
	5	.264/ 8.5	.260/ 8.5	.247/ 8.5	.227/ 8.5	.201/ 8.5	.171/ 8.5	.135/ 8.5	.098/ 8.3	.067/ 7.1	.045/ 6.7	.030/ 6.5	.021/ 6.3	.018/ 6.3
	6	.380/ 8.5	.376/ 8.5	.365/ 8.5	.346/ 8.5	.319/ 8.5	.282/ 8.5	.235/ 8.5	.183/ 8.5	.134/ 8.3	.095/ 8.1	.067/ 8.1	.050/ 7.9	.043/ 7.9
	7	.413/ 8.7	.412/ 8.7	.410/ 8.7	.402/ 8.7	.386/ 8.7	.357/ 8.7	.314/ 8.7	.261/ 8.5	.208/ 8.5	.161/ 8.5	.123/ 8.7	.098/ 9.0	.088/ 9.5
	8	.396/ 8.7	.399/ 8.7	.405/ 8.7	.410/ 8.7	.407/ 8.7	.390/ 8.7	.358/ 8.7	.314/ 8.7	.266/ 8.7	.220/ 9.0	.180/ 9.5	.151/ 9.5	.141/ 9.5
	9	.360/ 8.7	.365/ 8.7	.377/ 8.7	.390/ 8.7	.397/ 8.7	.390/ 8.7	.370/ 8.7	.337/ 9.0	.296/ 9.0	.255/ 9.5	.217/ 9.5	.189/ 9.8	.178/ 9.8
	10	.319/ 8.7	.325/ 8.7	.341/ 8.7	.358/ 8.7	.371/ 8.7	.372/ 8.7	.359/ 8.7	.335/ 9.0	.302/ 9.0	.265/ 9.5	.231/ 9.8	.205/ 9.8	.195/ 9.8

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. FOOT = 0.305 METRES

TABLE 22 - MONOB I, 0, 3, AND 6 KNOT PITCH ANGLES FOR SHORT CRESTED BRETSCHNEIDER SEAS

MONOB I

BRETSCHNEIDER SHORT CRESTED, 1 FOOT SIGNIFICANT WAVE HEIGHT
RMS PITCH IN DEGREES/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3	.027/ 3.9	.028/ 3.9	.031/ 3.9	.034/ 3.9	.037/ 3.9	.038/ 3.9	.039/ 3.9	.037/ 3.9	.035/ 3.9	.032/ 3.9	.029/ 3.9	.027/ 3.9	.026/ 3.9
	4	.117/ 4.8	.120/ 4.8	.127/ 4.8	.135/ 4.8	.142/ 4.8	.146/ 4.5	.146/ 4.5	.143/ 4.5	.136/ 4.8	.128/ 4.8	.120/ 4.8	.115/ 4.8	.113/ 4.8
	5	.208/ 5.2	.209/ 5.2	.211/ 5.2	.214/ 5.2	.216/ 4.8	.217/ 4.8	.215/ 4.8	.212/ 4.8	.209/ 5.2	.206/ 5.2	.204/ 5.2	.203/ 5.2	.203/ 5.2
	6	.252/ 5.7	.251/ 5.7	.248/ 5.7	.243/ 5.7	.237/ 5.2	.232/ 5.2	.228/ 5.2	.228/ 5.2	.231/ 5.2	.236/ 5.7	.241/ 5.7	.246/ 5.7	.247/ 5.7
	7	.261/ 6.3	.258/ 6.3	.251/ 6.3	.241/ 6.3	.230/ 5.7	.221/ 5.7	.216/ 5.2	.218/ 5.7	.225/ 5.7	.236/ 6.3	.246/ 6.3	.254/ 6.3	.257/ 6.3
	8	.251/ 6.7	.248/ 6.7	.239/ 6.7	.227/ 6.5	.212/ 6.3	.201/ 6.3	.196/ 5.7	.199/ 6.3	.209/ 6.3	.222/ 6.5	.235/ 6.7	.245/ 6.7	.248/ 6.7
	9	.234/ 7.3	.231/ 7.1	.221/ 7.1	.207/ 7.1	.192/ 7.0	.180/ 6.5	.175/ 6.3	.178/ 6.5	.189/ 7.0	.204/ 7.1	.218/ 7.1	.228/ 7.3	.231/ 7.3
	10	.215/ 7.7	.211/ 7.7	.202/ 7.7	.188/ 7.5	.173/ 7.5	.160/ 7.1	.155/ 7.0	.159/ 7.1	.170/ 7.5	.185/ 7.7	.199/ 7.7	.209/ 7.7	.212/ 7.7
3	3	.041/ 4.5	.043/ 4.5	.047/ 4.5	.050/ 4.5	.052/ 4.5	.051/ 4.5	.047/ 4.5	.041/ 4.5	.034/ 4.2	.025/ 4.2	.019/ 4.2	.015/ 3.9	.014/ 3.9
	4	.118/ 5.2	.121/ 5.2	.130/ 5.2	.140/ 4.8	.146/ 4.8	.148/ 4.8	.145/ 4.8	.137/ 4.8	.126/ 4.8	.114/ 4.8	.104/ 5.2	.098/ 5.2	.096/ 5.2
	5	.178/ 6.5	.180/ 6.5	.186/ 6.4	.194/ 5.2	.200/ 5.2	.205/ 5.2	.209/ 5.2	.211/ 5.2	.211/ 5.2	.212/ 5.2	.212/ 5.7	.213/ 5.7	.214/ 5.7
	6	.213/ 7.0	.213/ 7.0	.213/ 7.0	.213/ 6.8	.214/ 6.5	.217/ 5.7	.224/ 5.2	.233/ 5.7	.245/ 5.7	.257/ 5.7	.267/ 5.7	.275/ 5.7	.278/ 5.7
	7	.223/ 7.5	.221/ 7.5	.217/ 7.5	.212/ 7.3	.207/ 7.1	.207/ 6.5	.213/ 5.7	.226/ 5.7	.243/ 5.7	.261/ 5.7	.277/ 6.3	.288/ 6.3	.292/ 6.3
	8	.218/ 8.1	.216/ 8.1	.210/ 7.9	.201/ 7.9	.193/ 7.7	.189/ 7.1	.194/ 6.3	.207/ 6.3	.226/ 6.3	.247/ 6.3	.265/ 6.3	.277/ 6.3	.281/ 6.3
	9	.206/ 8.5	.204/ 8.5	.196/ 8.5	.186/ 8.3	.175/ 8.1	.170/ 7.7	.173/ 7.0	.186/ 6.3	.205/ 6.3	.226/ 6.5	.244/ 6.7	.256/ 6.7	.261/ 6.7
	10	.192/ 9.0	.189/ 9.0	.181/ 9.0	.170/ 8.7	.159/ 8.7	.152/ 8.1	.154/ 7.5	.166/ 7.0	.184/ 7.0	.204/ 7.0	.221/ 7.1	.233/ 7.1	.237/ 7.1
6	3	.034/ 4.8	.038/ 4.8	.045/ 4.8	.051/ 4.8	.054/ 4.8	.054/ 4.8	.051/ 4.8	.044/ 4.8	.036/ 4.2	.025/ 4.2	.015/ 4.2	.010/ 3.9	.009/ 3.9
	4	.107/ 7.9	.113/ 5.7	.124/ 5.2	.137/ 5.2	.145/ 5.2	.147/ 5.2	.142/ 5.2	.131/ 5.2	.115/ 5.2	.099/ 5.2	.085/ 5.2	.076/ 5.2	.073/ 5.7
	5	.148/ 8.3	.152/ 8.3	.161/ 8.3	.172/ 8.3	.183/ 5.2	.192/ 5.2	.199/ 5.2	.203/ 5.7	.204/ 5.7	.203/ 5.7	.202/ 5.7	.202/ 5.7	.202/ 5.7
	6	.182/ 8.7	.183/ 8.7	.186/ 8.7	.190/ 8.5	.196/ 8.5	.206/ 5.7	.219/ 5.7	.234/ 5.7	.250/ 5.7	.264/ 5.7	.276/ 6.3	.284/ 6.3	.287/ 6.3
	7	.196/ 9.0	.195/ 9.0	.193/ 9.0	.191/ 9.0	.191/ 8.7	.198/ 8.3	.212/ 5.7	.232/ 5.7	.255/ 6.3	.277/ 6.3	.296/ 6.3	.308/ 6.3	.313/ 6.3
	8	.195/ 9.5	.193/ 9.5	.189/ 9.2	.183/ 9.2	.179/ 9.0	.182/ 8.7	.195/ 6.3	.215/ 6.3	.240/ 6.3	.265/ 6.3	.286/ 6.3	.300/ 6.3	.305/ 6.3
	9	.187/ 9.8	.185/ 9.8	.179/ 9.8	.170/ 9.5	.164/ 9.5	.164/ 9.0	.175/ 6.3	.194/ 6.3	.218/ 6.3	.243/ 6.3	.264/ 6.3	.278/ 6.5	.283/ 6.5
	10	.176/10.1	.173/10.1	.166/10.1	.157/10.1	.149/ 9.8	.147/ 9.5	.155/ 8.5	.173/ 6.3	.196/ 6.3	.219/ 6.5	.239/ 6.5	.253/ 6.7	.257/ 6.7

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 23 - MONOB 1, 0, 3, AND 6 KNOT VERTICAL DISPLACEMENTS AT THE CG (HEAVE) FOR SHORT CRESTED BRETSCHNEIDER SEAS

MONOB 1

BRETSCHNEIDER SHORT CRESTED, 1 FOOT SIGNIFICANT WAVE HEIGHT

RMS VER DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{0E}, IN SECONDS

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3	.008/ 4.5	.010/ 4.5	.014/ 4.5	.017/ 4.5	.021/ 4.5	.023/ 4.5	.023/ 4.5	.023/ 4.5	.021/ 4.5	.018/ 4.5	.014/ 4.5	.011/ 4.5	.009/ 4.5
	4	.040/ 4.5	.047/ 4.8	.064/ 4.8	.081/ 4.8	.096/ 4.8	.106/ 4.8	.110/ 4.8	.108/ 4.8	.099/ 4.8	.085/ 4.8	.069/ 4.8	.052/ 4.8	.045/ 4.5
	5	.077/ 6.3	.087/ 5.7	.111/ 5.2	.137/ 5.2	.160/ 5.2	.175/ 5.2	.181/ 5.2	.177/ 5.2	.164/ 5.2	.143/ 5.2	.118/ 5.2	.094/ 5.7	.084/ 5.7
	6	.115/ 6.7	.124/ 6.7	.145/ 6.5	.171/ 6.3	.193/ 5.7	.209/ 5.7	.215/ 5.7	.211/ 5.7	.197/ 5.7	.176/ 6.3	.151/ 6.5	.129/ 6.7	.121/ 6.7
	7	.147/ 7.7	.154/ 7.5	.171/ 7.5	.192/ 7.3	.211/ 7.1	.225/ 7.0	.230/ 7.0	.226/ 7.0	.214/ 7.1	.196/ 7.3	.175/ 7.5	.158/ 7.5	.152/ 7.5
	8	.173/ 8.3	.178/ 8.3	.191/ 8.3	.207/ 8.3	.222/ 8.1	.233/ 8.1	.237/ 8.1	.234/ 8.1	.224/ 8.1	.209/ 8.3	.193/ 8.3	.181/ 8.3	.176/ 8.3
	9	.192/ 9.0	.195/ 9.0	.205/ 9.0	.218/ 9.0	.229/ 9.0	.238/ 9.0	.241/ 9.0	.239/ 9.0	.231/ 9.0	.219/ 9.0	.207/ 9.0	.197/ 9.0	.194/ 9.0
	10	.206/10.5	.208/10.5	.216/10.5	.225/10.5	.235/ 9.8	.241/ 9.8	.244/ 9.8	.242/ 9.8	.236/ 9.8	.227/10.5	.217/10.5	.210/10.5	.207/10.5
3	3	.011/ 4.8	.013/ 4.8	.016/ 4.8	.019/ 4.5	.022/ 4.2	.023/ 4.2	.024/ 4.2	.022/ 4.5	.020/ 4.5	.016/ 4.5	.012/ 4.5	.008/ 4.5	.006/ 4.5
	4	.037/ 5.7	.045/ 4.8	.062/ 4.8	.080/ 4.8	.095/ 4.8	.105/ 4.8	.109/ 4.8	.106/ 4.8	.098/ 4.8	.083/ 4.8	.066/ 4.8	.049/ 5.2	.041/ 5.2
	5	.070/ 7.0	.081/ 6.8	.105/ 5.2	.133/ 5.2	.157/ 5.2	.174/ 5.2	.182/ 5.2	.181/ 5.2	.170/ 5.2	.151/ 5.2	.127/ 5.2	.106/ 5.7	.097/ 5.7
	6	.106/ 7.7	.115/ 7.7	.138/ 7.5	.165/ 7.0	.190/ 6.3	.208/ 5.7	.218/ 5.7	.217/ 5.7	.207/ 5.7	.189/ 5.7	.168/ 6.3	.149/ 6.3	.141/ 6.3
	7	.139/ 8.5	.145/ 8.5	.163/ 8.3	.185/ 8.1	.207/ 7.7	.224/ 7.3	.233/ 7.1	.233/ 7.0	.225/ 7.0	.210/ 7.1	.193/ 7.3	.178/ 7.3	.172/ 7.5
	8	.164/ 9.2	.169/ 9.2	.183/ 9.2	.200/ 9.0	.218/ 8.7	.232/ 8.5	.240/ 8.3	.240/ 8.1	.234/ 8.1	.222/ 8.1	.209/ 8.3	.198/ 8.3	.194/ 8.3
	9	.184/10.1	.188/10.1	.198/10.1	.212/ 9.8	.226/ 9.5	.237/ 9.5	.243/ 9.2	.244/ 9.0	.239/ 9.0	.230/ 9.0	.220/ 9.0	.212/ 9.0	.209/ 9.0
	10	.199/11.2	.202/11.2	.210/10.8	.220/10.8	.231/10.5	.240/10.5	.245/10.5	.246/10.1	.242/10.1	.236/10.5	.228/10.5	.222/10.5	.219/10.5
6	3	.009/ 5.7	.012/ 4.8	.016/ 4.8	.020/ 4.5	.023/ 4.5	.025/ 4.5	.025/ 4.5	.023/ 4.5	.020/ 4.5	.016/ 4.5	.011/ 4.5	.006/ 4.5	.004/ 4.5
	4	.034/ 5.7	.043/ 5.7	.061/ 4.8	.079/ 4.8	.094/ 4.8	.104/ 4.8	.107/ 4.8	.104/ 4.8	.095/ 4.8	.080/ 4.8	.063/ 5.2	.046/ 5.2	.038/ 5.7
	5	.065/ 8.7	.076/ 8.7	.101/ 5.7	.129/ 5.2	.154/ 5.2	.173/ 5.2	.182/ 5.2	.183/ 5.2	.174/ 5.7	.158/ 5.7	.138/ 5.7	.119/ 5.7	.112/ 6.3
	6	.100/ 9.2	.109/ 9.2	.132/ 9.0	.160/ 6.8	.186/ 5.7	.208/ 5.7	.221/ 5.7	.225/ 5.7	.220/ 6.3	.208/ 6.3	.192/ 6.3	.178/ 6.3	.172/ 6.3
	7	.132/ 9.8	.139/ 9.8	.157/ 9.5	.180/ 9.2	.204/ 8.3	.224/ 7.5	.237/ 7.1	.243/ 6.5	.241/ 6.3	.232/ 6.3	.220/ 6.3	.210/ 6.3	.206/ 6.3
	8	.158/10.5	.163/10.5	.177/10.5	.196/10.1	.215/ 9.5	.232/ 9.0	.244/ 8.5	.250/ 8.3	.249/ 8.1	.243/ 8.1	.234/ 8.1	.227/ 8.1	.224/ 8.1
	9	.179/11.2	.182/11.2	.193/11.2	.207/10.8	.223/10.5	.237/ 9.8	.247/ 9.5	.252/ 9.0	.252/ 9.0	.247/ 9.0	.241/ 9.0	.236/ 9.0	.233/ 9.0
	10	.194/12.1	.197/12.1	.205/12.1	.216/11.6	.229/11.2	.240/10.8	.248/10.5	.252/10.5	.253/10.5	.249/10.5	.245/10.5	.241/10.5	.239/10.5

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 24 - MONOB I, 0, 3, AND 6 KNOT LONGITUDINAL DISPLACEMENTS AT THE CABLE SHEAVE FOR SHORT CRESTED BRETSCHNEIDER SEAS

MONOB I

BRETSCHNEIDER SHORT CRESTED, 1 FOOT SIGNIFICANT WAVE HEIGHT

RMS LON DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

CABLE SHEAVE - 39.25 FT AFT OF FP, 18.7 FT TO PORT OF CL, AND 24.9 FT ABOVE BL

V	T_0	0	15	30	45	60	75	90	105	120	135	150	165	180
		SHIP HEADING ANGLE IN DEGREES												
0	3	.005/ 3.9	.005/ 3.9	.005/ 3.9	.005/ 3.9	.005/ 3.9	.006/ 3.9	.006/ 3.9	.005/ 3.9	.005/ 3.9	.005/ 3.9	.004/ 3.9	.004/ 3.9	.004/ 3.9
	4	.016/ 5.2	.016/ 5.2	.017/ 5.2	.017/ 5.2	.018/ 5.2	.017/ 5.2	.016/ 4.8	.015/ 4.8	.014/ 5.2	.013/ 5.2	.012/ 5.2	.012/ 5.2	.012/ 5.2
	5	.040/ 6.3	.040/ 6.3	.041/ 6.3	.041/ 6.3	.040/ 6.3	.038/ 6.3	.034/ 5.7	.031/ 5.7	.028/ 6.3	.026/ 6.3	.026/ 6.3	.027/ 6.3	.027/ 6.3
	6	.078/ 8.3	.079/ 8.3	.080/ 8.3	.080/ 8.3	.079/ 8.3	.076/ 8.3	.070/ 8.3	.064/ 8.5	.058/ 8.5	.054/ 8.5	.052/ 8.5	.051/ 8.5	.051/ 8.5
	7	.119/ 8.3	.121/ 8.3	.124/ 8.5	.127/ 8.5	.128/ 8.5	.126/ 8.5	.122/ 8.5	.115/ 8.5	.107/ 8.5	.099/ 8.5	.093/ 9.0	.089/ 9.0	.088/ 9.0
	8	.143/ 8.5	.144/ 8.5	.149/ 8.5	.154/ 8.5	.158/ 8.5	.159/ 8.5	.157/ 8.5	.152/ 8.5	.145/ 9.0	.137/ 9.0	.130/ 9.0	.126/ 9.0	.124/ 9.0
	9	.149/ 8.5	.150/ 8.5	.155/ 8.5	.160/ 8.5	.165/ 8.5	.169/ 8.5	.169/ 8.5	.168/ 8.5	.164/ 9.0	.158/ 9.0	.153/ 9.0	.150/ 9.0	.148/ 9.0
	10	.146/ 8.5	.147/ 8.5	.151/ 8.5	.156/ 8.5	.161/ 8.5	.165/ 8.5	.168/ 8.5	.170/ 9.0	.169/ 9.0	.167/ 9.0	.165/ 9.0	.163/ 9.0	.163/ 9.0
3	3	.007/ 5.2	.007/ 5.2	.007/ 5.2	.007/ 5.2	.007/ 4.5	.006/ 4.5	.006/ 4.2	.005/ 4.2	.005/ 3.9	.004/ 3.9	.004/ 3.9	.003/ 3.9	.003/ 3.9
	4	.024/ 6.4	.024/ 6.4	.024/ 6.3	.024/ 5.7	.023/ 5.7	.022/ 5.7	.020/ 5.7	.017/ 5.2	.014/ 5.2	.012/ 5.2	.011/ 5.2	.010/ 5.2	.010/ 5.2
	5	.062/ 7.1	.061/ 7.1	.060/ 7.1	.058/ 7.1	.054/ 7.0	.049/ 6.8	.042/ 6.5	.035/ 6.3	.029/ 6.3	.024/ 6.3	.023/ 6.3	.023/ 6.3	.023/ 6.3
	6	.111/ 8.3	.110/ 8.3	.107/ 8.3	.102/ 8.3	.094/ 8.3	.084/ 8.3	.073/ 8.3	.060/ 8.3	.050/ 8.3	.043/ 8.1	.040/ 7.0	.039/ 7.0	.040/ 7.0
	7	.143/ 8.5	.142/ 8.5	.139/ 8.5	.134/ 8.5	.126/ 8.5	.116/ 8.5	.103/ 8.5	.090/ 8.5	.079/ 8.5	.070/ 9.0	.065/ 9.0	.064/ 9.5	.063/ 9.5
	8	.156/ 8.5	.155/ 8.5	.153/ 8.5	.148/ 8.5	.141/ 8.5	.133/ 8.5	.124/ 8.5	.115/ 8.7	.107/ 9.0	.100/ 9.5	.096/ 9.5	.094/ 9.5	.094/ 9.5
	9	.159/ 8.5	.158/ 8.5	.155/ 8.5	.150/ 8.5	.144/ 8.5	.138/ 8.5	.133/ 8.5	.128/ 8.7	.125/ 9.5	.122/ 9.5	.121/ 9.5	.120/ 9.8	.120/ 9.8
	10	.160/ 8.5	.158/ 8.5	.154/ 8.5	.147/ 8.5	.141/ 8.5	.136/ 8.5	.133/ 8.7	.133/ 9.0	.134/ 9.5	.135/ 9.5	.136/ 9.8	.136/ 9.8	.137/ 9.8
6	3	.016/ 7.7	.016/ 7.7	.015/ 7.7	.014/ 7.7	.012/ 6.8	.010/ 6.8	.008/ 6.8	.006/ 5.7	.005/ 5.7	.004/ 3.9	.003/ 3.9	.002/ 3.9	.002/ 3.9
	4	.051/ 7.7	.050/ 7.7	.047/ 7.7	.044/ 7.7	.039/ 7.7	.033/ 6.8	.027/ 6.8	.021/ 6.8	.015/ 5.7	.011/ 5.2	.009/ 5.2	.008/ 5.2	.008/ 5.2
	5	.109/ 8.5	.107/ 8.5	.102/ 8.5	.094/ 8.5	.084/ 8.5	.072/ 8.3	.057/ 8.3	.042/ 7.9	.030/ 7.1	.023/ 6.3	.020/ 6.3	.020/ 6.3	.020/ 6.3
	6	.150/ 8.5	.148/ 8.5	.142/ 8.5	.132/ 8.5	.118/ 8.5	.102/ 8.5	.083/ 8.3	.063/ 8.3	.047/ 8.1	.037/ 7.7	.034/ 7.1	.033/ 7.0	.034/ 7.0
	7	.169/ 8.5	.167/ 8.5	.160/ 8.5	.149/ 8.5	.135/ 8.5	.118/ 8.5	.098/ 8.5	.079/ 8.5	.063/ 8.5	.054/ 8.5	.049/ 8.3	.048/ 8.1	.048/ 7.9
	8	.179/ 8.5	.176/ 8.5	.168/ 8.5	.157/ 8.5	.141/ 8.5	.125/ 8.5	.107/ 8.5	.092/ 8.5	.080/ 8.7	.072/ 9.0	.068/10.5	.067/10.5	.066/10.5
	9	.186/ 8.5	.182/ 8.5	.173/ 8.5	.160/ 8.5	.144/ 8.5	.127/ 8.5	.112/ 8.5	.101/ 8.7	.093/ 9.8	.089/10.5	.087/10.5	.086/10.5	.085/10.5
	10	.191/12.1	.187/12.1	.177/12.1	.162/12.1	.144/ 8.5	.127/ 8.5	.114/ 8.7	.106/ 8.7	.103/10.5	.102/10.5	.102/10.5	.102/10.5	.102/10.5

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 24 - MONOB 1, 0, 3, AND 6 KNOT LONGITUDINAL DISPLACEMENTS AT THE CABLE SHEAVE FOR SHORT CRESTED BRETSCHNEIDER SEAS

MONOB 1

BRETSCHNEIDER SHORT CRESTED, 1 FOOT SIGNIFICANT WAVE HEIGHT

RMS LON DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

CABLE SHEAVE - 39.25 FT AFT OF FP, 18.7 FT TO PORT OF CL, AND 24.9 FT ABOVE BL

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3	.005/ 3.9	.005/ 3.9	.005/ 3.9	.005/ 3.9	.005/ 3.9	.006/ 3.9	.006/ 3.9	.005/ 3.9	.005/ 3.9	.005/ 3.9	.004/ 3.9	.004/ 3.9	.004/ 3.9
	4	.016/ 5.2	.016/ 5.2	.017/ 5.2	.017/ 5.2	.018/ 5.2	.017/ 5.2	.016/ 4.8	.015/ 4.8	.014/ 5.2	.013/ 5.2	.012/ 5.2	.012/ 5.2	.012/ 5.2
	5	.040/ 6.3	.040/ 6.3	.041/ 6.3	.041/ 6.3	.040/ 6.3	.038/ 6.3	.034/ 5.7	.031/ 5.7	.028/ 6.3	.026/ 6.3	.026/ 6.3	.027/ 6.3	.027/ 6.3
	6	.078/ 8.3	.079/ 8.3	.080/ 8.3	.080/ 8.3	.079/ 8.3	.076/ 8.3	.070/ 8.3	.064/ 8.5	.058/ 8.5	.054/ 8.5	.052/ 8.5	.051/ 8.5	.051/ 8.5
	7	.119/ 8.3	.121/ 8.3	.124/ 8.5	.127/ 8.5	.128/ 8.5	.126/ 8.5	.122/ 8.5	.115/ 8.5	.107/ 8.5	.099/ 8.5	.093/ 9.0	.089/ 9.0	.088/ 9.0
	8	.143/ 8.5	.144/ 8.5	.149/ 8.5	.154/ 8.5	.158/ 8.5	.159/ 8.5	.157/ 8.5	.152/ 8.5	.145/ 9.0	.137/ 9.0	.130/ 9.0	.126/ 9.0	.124/ 9.0
	9	.149/ 8.5	.150/ 8.5	.155/ 8.5	.160/ 8.5	.165/ 8.5	.169/ 8.5	.169/ 8.5	.168/ 8.5	.164/ 9.0	.158/ 9.0	.153/ 9.0	.150/ 9.0	.148/ 9.0
	10	.146/ 8.5	.147/ 8.5	.151/ 8.5	.156/ 8.5	.161/ 8.5	.165/ 8.5	.168/ 8.5	.170/ 9.0	.169/ 9.0	.167/ 9.0	.165/ 9.0	.163/ 9.0	.163/ 9.0
3	3	.007/ 5.2	.007/ 5.2	.007/ 5.2	.007/ 5.2	.007/ 4.5	.006/ 4.5	.006/ 4.2	.005/ 4.2	.005/ 3.9	.004/ 3.9	.004/ 3.9	.003/ 3.9	.003/ 3.9
	4	.024/ 6.4	.024/ 6.4	.024/ 6.3	.024/ 5.7	.023/ 5.7	.022/ 5.7	.020/ 5.7	.017/ 5.2	.014/ 5.2	.012/ 5.2	.011/ 5.2	.010/ 5.2	.010/ 5.2
	5	.062/ 7.1	.061/ 7.1	.060/ 7.1	.058/ 7.1	.054/ 7.0	.049/ 6.8	.042/ 6.5	.035/ 6.3	.029/ 6.3	.024/ 6.3	.023/ 6.3	.023/ 6.3	.023/ 6.3
	6	.111/ 8.3	.110/ 8.3	.107/ 8.3	.102/ 8.3	.094/ 8.3	.084/ 8.3	.073/ 8.3	.060/ 8.3	.050/ 8.3	.043/ 8.1	.040/ 7.0	.039/ 7.0	.040/ 7.0
	7	.143/ 8.5	.142/ 8.5	.139/ 8.5	.134/ 8.5	.126/ 8.5	.116/ 8.5	.103/ 8.5	.090/ 8.5	.079/ 8.5	.070/ 9.0	.065/ 9.0	.064/ 9.5	.063/ 9.5
	8	.156/ 8.5	.155/ 8.5	.153/ 8.5	.148/ 8.5	.141/ 8.5	.133/ 8.5	.124/ 8.5	.115/ 8.7	.107/ 9.0	.100/ 9.5	.096/ 9.5	.094/ 9.5	.094/ 9.5
	9	.159/ 8.5	.158/ 8.5	.155/ 8.5	.150/ 8.5	.144/ 8.5	.138/ 8.5	.133/ 8.5	.128/ 8.7	.125/ 9.5	.122/ 9.5	.121/ 9.5	.120/ 9.8	.120/ 9.8
	10	.160/ 8.5	.158/ 8.5	.154/ 8.5	.147/ 8.5	.141/ 8.5	.136/ 8.5	.133/ 8.7	.133/ 9.0	.134/ 9.5	.135/ 9.5	.136/ 9.8	.136/ 9.8	.137/ 9.8
6	3	.016/ 7.7	.016/ 7.7	.015/ 7.7	.014/ 7.7	.012/ 6.8	.010/ 6.8	.008/ 6.8	.006/ 5.7	.005/ 5.7	.004/ 3.9	.003/ 3.9	.002/ 3.9	.002/ 3.9
	4	.051/ 7.7	.050/ 7.7	.047/ 7.7	.044/ 7.7	.039/ 7.7	.033/ 6.8	.027/ 6.8	.021/ 6.8	.015/ 5.7	.011/ 5.2	.009/ 5.2	.008/ 5.2	.008/ 5.2
	5	.109/ 8.5	.107/ 8.5	.102/ 8.5	.094/ 8.5	.084/ 8.5	.072/ 8.3	.057/ 8.3	.042/ 7.9	.030/ 7.1	.023/ 6.3	.020/ 6.3	.020/ 6.3	.020/ 6.3
	6	.150/ 8.5	.148/ 8.5	.142/ 8.5	.132/ 8.5	.118/ 8.5	.102/ 8.5	.083/ 8.3	.063/ 8.3	.047/ 8.1	.037/ 7.7	.034/ 7.1	.033/ 7.0	.034/ 7.0
	7	.169/ 8.5	.167/ 8.5	.160/ 8.5	.149/ 8.5	.135/ 8.5	.118/ 8.5	.098/ 8.5	.079/ 8.5	.063/ 8.5	.054/ 8.5	.049/ 8.3	.048/ 8.1	.048/ 7.9
	8	.179/ 8.5	.176/ 8.5	.168/ 8.5	.157/ 8.5	.141/ 8.5	.125/ 8.5	.107/ 8.5	.092/ 8.5	.080/ 8.7	.072/ 9.0	.068/10.5	.067/10.5	.066/10.5
	9	.186/ 8.5	.182/ 8.5	.173/ 8.5	.160/ 8.5	.144/ 8.5	.127/ 8.5	.112/ 8.5	.101/ 8.7	.093/ 9.8	.089/10.5	.087/10.5	.086/10.5	.085/10.5
	10	.191/12.1	.187/12.1	.177/12.1	.162/12.1	.144/ 8.5	.127/ 8.5	.114/ 8.7	.106/ 8.7	.103/10.5	.102/10.5	.102/10.5	.102/10.5	.102/10.5

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 25 - MONOB I, 0, 3, AND 6 KNOT LATERAL DISPLACEMENTS AT THE CABLE SHEAVE FOR SHORT CRESTED BRETSCHNEIDER SEAS

MONOB I

BRETSCHNEIDER SHORT CRESTED, 1 FOOT SIGNIFICANT WAVE HEIGHT

RMS LAT DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

CABLE SHEAVE - 39.25 FT AFT OF FP, 18.7 FT TO PORT OF CL, AND 24.9 FT ABOVE BL

V	T_0	0	15	30	45	60	75	90	105	120	135	150	165	180
		SHIP HEADING ANGLE IN DEGREES												
0	3	.011/ 3.9	.014/ 3.5	.019/ 3.5	.024/ 3.5	.027/ 3.5	.029/ 3.5	.030/ 3.5	.028/ 3.5	.025/ 3.5	.021/ 3.5	.016/ 3.9	.011/ 3.9	.009/ 3.9
	4	.032/ 4.8	.036/ 4.8	.047/ 4.8	.057/ 4.8	.066/ 4.5	.072/ 4.5	.073/ 4.5	.070/ 4.5	.064/ 4.8	.055/ 4.8	.044/ 4.8	.034/ 4.8	.030/ 4.8
	5	.061/ 5.7	.067/ 5.7	.081/ 5.7	.096/ 5.7	.109/ 5.7	.117/ 5.7	.120/ 5.7	.116/ 5.7	.106/ 5.7	.093/ 5.7	.077/ 5.7	.064/ 5.7	.058/ 5.7
	6	.098/ 8.3	.105/ 8.3	.122/ 8.3	.141/ 7.0	.158/ 7.0	.168/ 7.0	.170/ 7.0	.165/ 7.0	.152/ 7.0	.135/ 7.0	.115/ 7.0	.098/ 7.0	.091/ 7.0
	7	.139/ 8.3	.147/ 8.3	.166/ 8.3	.188/ 8.3	.207/ 8.3	.218/ 8.3	.220/ 8.3	.213/ 8.3	.197/ 8.3	.175/ 8.3	.151/ 8.3	.132/ 8.3	.124/ 8.3
	8	.161/ 8.5	.169/ 8.5	.189/ 8.5	.212/ 8.3	.231/ 8.3	.243/ 8.3	.244/ 8.3	.235/ 8.3	.218/ 8.3	.194/ 8.3	.169/ 8.3	.148/ 8.3	.140/ 8.3
	9	.164/ 8.5	.172/ 8.5	.191/ 8.5	.213/ 8.5	.232/ 8.5	.243/ 8.3	.244/ 8.3	.235/ 8.3	.217/ 8.3	.194/ 8.3	.169/ 8.3	.149/ 8.5	.141/ 8.5
	10	.158/ 8.5	.165/ 8.5	.183/ 8.5	.204/ 8.5	.222/ 8.5	.233/ 8.5	.234/ 8.3	.225/ 8.3	.208/ 8.3	.186/ 8.3	.162/ 8.3	.143/ 8.5	.136/ 8.5
3	3	.012/ 4.5	.015/ 4.5	.020/ 4.2	.024/ 3.9	.028/ 3.9	.030/ 3.9	.030/ 3.9	.028/ 3.9	.025/ 3.9	.020/ 3.7	.015/ 3.7	.010/ 3.9	.007/ 3.9
	4	.039/ 5.7	.043/ 5.2	.053/ 5.2	.063/ 5.2	.071/ 4.8	.075/ 4.8	.075/ 4.8	.071/ 4.8	.063/ 4.8	.052/ 4.8	.040/ 4.8	.030/ 4.8	.026/ 4.8
	5	.077/ 6.7	.083/ 6.5	.095/ 6.4	.109/ 6.3	.119/ 6.3	.124/ 5.7	.123/ 5.7	.115/ 5.7	.103/ 5.7	.086/ 5.7	.069/ 5.7	.055/ 5.7	.050/ 5.7
	6	.124/ 8.5	.130/ 8.5	.143/ 8.5	.158/ 8.3	.169/ 7.9	.173/ 7.3	.170/ 7.1	.158/ 7.0	.141/ 7.0	.120/ 6.7	.098/ 6.7	.080/ 6.7	.073/ 6.7
	7	.155/ 8.5	.161/ 8.5	.176/ 8.5	.192/ 8.5	.205/ 8.5	.210/ 8.3	.205/ 8.3	.192/ 8.3	.171/ 8.1	.147/ 8.1	.122/ 8.1	.102/ 8.1	.094/ 8.3
	8	.163/ 8.5	.170/ 8.5	.185/ 8.5	.203/ 8.5	.217/ 8.5	.222/ 8.5	.218/ 8.3	.205/ 8.3	.184/ 8.3	.159/ 8.3	.134/ 8.5	.113/ 9.0	.105/ 9.0
	9	.158/ 8.5	.164/ 8.5	.180/ 8.5	.198/ 8.5	.212/ 8.5	.218/ 8.5	.215/ 8.5	.203/ 8.5	.184/ 8.5	.159/ 8.5	.135/ 9.0	.115/ 9.0	.108/ 9.0
	10	.149/ 8.5	.155/ 8.5	.171/ 8.5	.188/ 8.5	.202/ 8.5	.209/ 8.5	.207/ 8.5	.196/ 8.5	.177/ 8.5	.155/ 8.5	.131/ 9.0	.113/ 9.0	.105/ 9.0
6	3	.017/ 7.7	.019/ 7.7	.023/ 7.7	.027/ 5.7	.030/ 3.9	.032/ 3.9	.031/ 3.9	.029/ 3.9	.025/ 3.9	.020/ 3.9	.014/ 3.9	.009/ 3.9	.006/ 3.9
	4	.057/ 6.8	.060/ 6.8	.068/ 6.8	.075/ 5.7	.081/ 5.7	.082/ 5.7	.079/ 5.7	.073/ 5.2	.062/ 4.8	.050/ 4.8	.037/ 4.8	.027/ 4.8	.022/ 4.8
	5	.124/ 8.5	.127/ 8.5	.133/ 8.5	.140/ 8.5	.143/ 8.5	.141/ 6.8	.133/ 6.3	.119/ 6.3	.102/ 5.7	.082/ 5.7	.064/ 5.7	.049/ 5.7	.043/ 5.7
	6	.169/ 8.5	.172/ 8.5	.180/ 8.5	.188/ 8.5	.192/ 8.5	.189/ 8.5	.177/ 8.3	.159/ 7.5	.136/ 7.0	.111/ 6.8	.088/ 6.7	.070/ 6.7	.063/ 6.7
	7	.180/ 8.5	.184/ 8.5	.195/ 8.5	.206/ 8.5	.213/ 8.5	.212/ 8.5	.202/ 8.3	.184/ 8.3	.160/ 8.1	.133/ 7.9	.108/ 7.9	.088/ 7.9	.080/ 7.9
	8	.173/ 8.5	.178/ 8.5	.190/ 8.5	.204/ 8.5	.214/ 8.5	.216/ 8.5	.208/ 8.5	.192/ 8.3	.170/ 8.3	.144/ 8.3	.119/ 8.3	.100/ 8.5	.092/ 9.0
	9	.161/ 8.7	.166/ 8.7	.179/ 8.5	.194/ 8.5	.206/ 8.5	.209/ 8.5	.204/ 8.5	.190/ 8.5	.170/ 8.5	.146/ 8.5	.123/ 8.7	.104/ 9.0	.097/ 9.0
	10	.149/ 8.7	.155/ 8.7	.169/ 8.5	.184/ 8.5	.196/ 8.5	.201/ 8.5	.197/ 8.5	.185/ 8.5	.166/ 8.5	.144/ 8.5	.122/ 9.0	.104/ 9.0	.097/ 9.5

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 26 - MONOB I, 0, 3, AND 6 KNOT VERTICAL DISPLACEMENTS AT THE CABLE SHEAVE FOR SHORT CRESTED BRETSCHNEIDER SEAS

MONOB I

BRETSCHNEIDER SHORT CRESTED, 1 FOOT SIGNIFICANT WAVE HEIGHT
RMS VER DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS
CABLE SHEAVE - 39.25 FT AFT OF FP, 18.7 FT TO PORT OF CL, AND 24.9 FT ABOVE BL

V	T_0	0	15	30	45	60	75	90	105	120	135	150	165	180
		SHIP HEADING ANGLE IN DEGREES												
0	3	.028/ 3.9	.030/ 3.9	.033/ 3.9	.037/ 3.9	.041/ 3.9	.042/ 3.9	.042/ 3.9	.040/ 3.9	.036/ 3.9	.031/ 3.9	.026/ 3.9	.023/ 3.9	.022/ 3.9
	4	.110/ 4.8	.115/ 4.8	.128/ 4.8	.143/ 4.8	.156/ 4.5	.164/ 4.5	.165/ 4.8	.160/ 4.8	.148/ 4.8	.132/ 4.8	.114/ 4.8	.099/ 4.8	.093/ 4.8
	5	.184/ 5.2	.190/ 5.2	.204/ 5.2	.223/ 5.2	.240/ 4.8	.251/ 4.8	.255/ 4.8	.250/ 4.8	.237/ 5.2	.219/ 5.2	.199/ 5.2	.183/ 5.7	.176/ 5.7
	6	.229/ 5.7	.233/ 5.7	.247/ 5.7	.264/ 5.7	.281/ 5.2	.295/ 5.2	.302/ 5.2	.300/ 5.7	.292/ 5.7	.277/ 6.3	.261/ 6.3	.248/ 6.3	.243/ 6.3
	7	.265/ 8.5	.270/ 8.5	.285/ 8.5	.304/ 8.5	.323/ 8.5	.339/ 8.5	.349/ 8.5	.350/ 8.5	.343/ 8.5	.330/ 8.3	.314/ 8.3	.301/ 8.3	.296/ 8.3
	8	.294/ 9.0	.299/ 9.0	.315/ 8.5	.336/ 8.5	.357/ 8.5	.373/ 8.5	.383/ 8.5	.383/ 8.5	.375/ 8.5	.360/ 8.5	.344/ 8.5	.330/ 8.5	.325/ 8.5
	9	.308/ 9.0	.313/ 9.0	.329/ 9.0	.349/ 9.0	.368/ 8.5	.383/ 8.5	.391/ 8.5	.390/ 8.5	.381/ 8.5	.365/ 8.5	.348/ 8.5	.335/ 8.5	.330/ 8.5
	10	.310/ 9.0	.315/ 9.0	.329/ 9.0	.346/ 9.0	.364/ 9.0	.376/ 8.5	.382/ 8.5	.380/ 8.5	.370/ 8.5	.356/ 8.5	.340/ 8.5	.328/ 8.5	.323/ 8.5
3	3	.043/ 4.5	.044/ 4.5	.048/ 4.5	.051/ 4.5	.052/ 4.5	.051/ 4.5	.047/ 4.5	.042/ 4.5	.035/ 4.2	.026/ 4.2	.019/ 4.2	.014/ 4.5	.013/ 3.9
	4	.099/ 5.2	.106/ 5.2	.122/ 4.8	.140/ 4.8	.154/ 4.8	.163/ 4.8	.164/ 4.8	.157/ 4.8	.143/ 4.8	.124/ 4.8	.104/ 4.8	.087/ 5.2	.080/ 5.2
	5	.146/ 6.5	.154/ 6.4	.175/ 5.2	.201/ 5.2	.225/ 5.2	.243/ 5.2	.252/ 5.2	.251/ 5.2	.240/ 5.2	.223/ 5.2	.202/ 5.2	.185/ 5.7	.179/ 5.7
	6	.198/ 8.7	.205/ 8.7	.223/ 8.7	.246/ 8.5	.269/ 8.5	.288/ 5.2	.299/ 5.2	.300/ 5.7	.294/ 5.7	.280/ 5.7	.265/ 5.7	.252/ 6.3	.247/ 6.3
	7	.254/ 8.7	.259/ 8.7	.274/ 8.7	.294/ 8.7	.314/ 8.7	.329/ 8.7	.337/ 8.5	.337/ 8.5	.330/ 8.5	.318/ 8.3	.303/ 7.0	.292/ 7.0	.288/ 7.0
	8	.288/ 8.7	.293/ 8.7	.307/ 8.7	.325/ 8.7	.343/ 8.7	.356/ 8.7	.363/ 8.7	.361/ 8.7	.353/ 9.0	.340/ 9.0	.326/ 9.0	.315/ 9.0	.311/ 9.0
	9	.300/ 8.7	.305/ 8.7	.318/ 8.7	.335/ 8.7	.352/ 8.7	.364/ 8.7	.369/ 8.7	.367/ 9.0	.359/ 9.0	.347/ 9.0	.333/ 9.0	.323/ 9.0	.320/ 9.0
	10	.301/ 8.7	.306/ 8.7	.317/ 8.7	.332/ 8.7	.347/ 8.7	.357/ 8.7	.362/ 9.0	.360/ 9.0	.353/ 9.0	.341/ 9.0	.330/ 9.0	.321/ 9.0	.317/ 9.0
6	3	.036/ 7.7	.039/ 4.8	.046/ 4.8	.052/ 4.8	.056/ 4.8	.056/ 4.8	.052/ 4.8	.046/ 4.2	.037/ 4.2	.026/ 4.2	.016/ 4.5	.010/ 4.5	.008/ 4.5
	4	.072/ 7.7	.081/ 7.7	.102/ 4.8	.123/ 4.8	.140/ 4.8	.151/ 4.8	.154/ 4.8	.148/ 4.8	.135/ 4.8	.116/ 4.8	.094/ 5.2	.075/ 5.2	.067/ 5.2
	5	.139/ 8.7	.147/ 8.7	.167/ 8.7	.193/ 8.7	.219/ 5.2	.239/ 5.2	.250/ 5.2	.252/ 5.2	.243/ 5.7	.227/ 5.7	.207/ 5.7	.190/ 5.7	.183/ 5.7
	6	.217/ 8.7	.222/ 8.7	.236/ 8.7	.256/ 8.7	.277/ 8.7	.295/ 8.7	.306/ 5.7	.310/ 5.7	.305/ 5.7	.295/ 5.7	.281/ 6.3	.269/ 6.3	.264/ 6.3
	7	.265/ 8.7	.269/ 8.7	.282/ 8.7	.299/ 8.7	.317/ 8.7	.331/ 8.7	.340/ 8.7	.341/ 8.5	.337/ 6.3	.328/ 6.3	.317/ 6.3	.308/ 6.3	.305/ 6.3
	8	.285/ 9.0	.289/ 9.0	.302/ 8.7	.318/ 8.7	.335/ 8.7	.349/ 8.7	.356/ 8.7	.357/ 8.7	.352/ 8.7	.344/ 8.7	.334/ 8.5	.327/ 8.3	.324/ 8.1
	9	.290/ 9.0	.294/ 9.0	.306/ 9.0	.322/ 9.0	.338/ 9.0	.351/ 9.0	.358/ 9.0	.359/ 9.0	.355/ 9.0	.348/ 9.0	.339/ 9.5	.333/ 9.5	.330/ 9.5
	10	.288/ 9.0	.292/ 9.0	.302/ 9.0	.317/ 9.0	.332/ 9.0	.344/ 9.0	.351/ 9.0	.352/ 9.0	.349/ 9.5	.343/ 9.5	.336/ 9.5	.330/ 9.5	.327/ 9.5

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 27 - MONOB I, 0, 3, AND 6 KNOT ROLL ANGLES FOR LONG CRESTED JONSWAP SEAS

MONOB I

JONSWAP LONG CRESTED

RMS ROLL IN DEGREES/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

(AT SIGNIFICANT WAVE HEIGHTS, IN FEET, OF 2.42, 4.64, 5.45, 7.48, 8.30, 9.70, 10.20, 13.13, RESPECTIVELY)

V	T_0	0	15	30	45	60	75	90	105	120	135	150	165	180
		SHIP HEADING ANGLE IN DEGREES												
0	3.9	.0/ 3.9	.0/ 3.9	.1/ 3.9	.1/ 3.9	.1/ 5.2	.1/ 4.8	.1/ 4.8	.1/ 5.2	.1/ 5.2	.0/ 5.2	.0/ 3.9	.0/ 3.9	0.0/****
	4.8	.0/ 6.3	.1/ 6.3	.2/ 6.3	.3/ 6.3	.3/ 5.2	.3/ 5.2	.3/ 5.2	.3/ 5.2	.3/ 5.2	.2/ 6.3	.2/ 6.3	.1/ 6.3	0.0/****
	5.5	.0/ 8.5	.2/ 8.5	.5/ 8.3	.6/ 8.3	.7/ 8.3	.7/ 8.3	.8/ 8.3	.7/ 8.3	.7/ 8.3	.6/ 8.3	.4/ 8.3	.2/ 8.5	0.0/****
	6.3	.0/ 8.5	.8/ 8.5	1.4/ 8.5	1.8/ 8.5	2.0/ 8.5	2.1/ 8.5	2.1/ 8.5	2.1/ 8.5	2.0/ 8.5	1.8/ 8.5	1.4/ 8.5	.8/ 8.5	0.0/****
	7.0	.0/ 8.5	1.4/ 8.5	2.3/ 8.5	2.9/ 8.5	3.2/ 8.5	3.4/ 8.5	3.4/ 8.5	3.4/ 8.5	3.2/ 8.5	2.9/ 8.5	2.3/ 8.5	1.4/ 8.5	0.0/****
	7.2	.0/ 8.5	2.0/ 8.5	3.4/ 8.5	4.2/ 8.5	4.7/ 8.5	4.9/ 8.5	4.9/ 8.5	4.9/ 8.5	4.7/ 8.5	4.2/ 8.5	3.4/ 8.5	2.0/ 8.5	0.0/****
	7.6	.0/ 8.5	2.8/ 8.5	4.7/ 8.5	5.8/ 8.5	6.3/ 8.5	6.6/ 8.5	6.7/ 8.5	6.6/ 8.5	6.3/ 8.5	5.8/ 8.5	4.7/ 8.5	2.8/ 8.5	0.0/****
	8.4	.0/ 8.5	4.9/ 8.5	8.0/ 8.5	9.8/ 8.5	10.7/ 8.5	11.1/ 8.5	11.2/ 8.5	11.1/ 8.5	10.7/ 8.5	9.8/ 8.5	8.0/ 8.5	4.9/ 8.5	0.0/****
3	3.9	.0/ 5.2	.1/ 5.2	.1/ 4.8	.1/ 4.8	.1/ 5.7	.1/ 5.2	.1/ 4.8	.0/ 5.2	.0/ 5.2	.0/ 5.2	.0/ 3.9	.0/ 3.9	0.0/****
	4.8	.0/ 8.5	.3/ 8.5	.4/ 7.3	.5/ 5.7	.5/ 5.7	.4/ 5.2	.3/ 5.2	.2/ 6.3	.2/ 6.3	.1/ 6.3	.1/ 6.3	.0/ 6.3	0.0/****
	5.5	.0/ 8.5	.6/ 8.5	.9/ 8.5	1.0/ 8.3	1.0/ 8.3	.8/ 7.9	.7/ 5.7	.5/ 5.7	.4/ 5.7	.3/ 5.7	.2/ 7.0	.1/ 7.0	0.0/****
	6.3	.0/ 8.5	1.6/ 8.5	2.3/ 8.5	2.5/ 8.5	2.3/ 8.5	2.1/ 8.3	1.8/ 8.3	1.4/ 8.3	1.1/ 9.0	.9/ 9.0	.6/ 9.0	.3/ 9.0	0.0/****
	7.0	.0/ 8.5	2.6/ 8.5	3.5/ 8.5	3.7/ 8.5	3.5/ 8.5	3.1/ 8.5	2.7/ 8.3	2.2/ 8.5	1.8/ 9.0	1.5/ 9.0	1.1/ 9.0	.6/ 9.5	0.0/****
	7.2	.0/ 8.5	3.8/ 8.5	5.0/ 8.5	5.3/ 8.5	5.0/ 8.3	4.5/ 8.3	3.9/ 8.3	3.1/ 8.5	2.6/ 9.0	2.2/ 9.0	1.6/ 9.0	1.0/ 9.5	0.0/****
	7.6	.0/ 8.5	4.2/ 8.7	5.8/ 8.5	6.4/ 8.5	6.2/ 8.5	5.7/ 8.5	5.1/ 8.3	4.1/ 8.5	3.4/ 9.0	2.9/ 9.0	2.1/ 9.0	1.4/ 9.5	0.0/****
	8.4	.0/ 8.5	3.9/ 8.7	6.0/ 8.7	7.4/ 8.7	8.3/ 8.7	8.5/ 8.7	8.2/ 8.5	7.0/ 9.0	6.3/ 9.0	5.7/ 9.0	4.3/ 9.0	2.8/ 9.5	0.0/****
6	3.9	.0/ 8.7	.3/ 7.7	.3/ 6.8	.2/ 6.3	.2/ 5.2	.1/ 4.8	.1/ 4.8	.0/ 5.2	.0/ 5.2	.0/ 3.9	.0/ 3.9	.0/ 3.9	0.0/****
	4.8	.0/ 8.7	1.3/ 8.5	1.3/ 8.5	1.0/ 6.8	.7/ 6.3	.5/ 5.7	.3/ 5.2	.2/ 6.3	.1/ 6.3	.1/ 6.3	.1/ 6.3	.0/ 6.3	0.0/****
	5.5	.0/ 8.7	2.5/ 8.5	2.5/ 8.3	2.0/ 8.3	1.4/ 6.8	.9/ 6.3	.6/ 5.7	.4/ 5.7	.3/ 5.7	.2/ 7.0	.1/ 7.0	.1/ 7.1	0.0/****
	6.3	.0/ 8.7	3.7/ 8.7	5.0/ 8.5	4.0/ 8.3	2.9/ 7.9	2.0/ 7.1	1.5/ 8.1	1.0/ 8.3	.7/ 6.5	.5/ 8.3	.3/ 8.3	.2/ 9.5	0.0/****
	7.0	.0/ 8.7	3.2/ 8.7	5.1/ 8.7	5.3/ 8.7	4.1/ 8.3	3.0/ 7.9	2.2/ 8.3	1.6/ 9.0	1.2/ 9.0	.9/ 9.5	.6/ 9.5	.3/ 9.8	0.0/****
	7.2	.0/ 8.7	3.3/ 8.7	5.2/ 8.7	6.1/ 8.7	5.3/ 8.5	4.1/ 8.1	3.0/ 7.7	2.3/ 9.0	1.7/ 9.0	1.3/ 9.5	.9/ 9.5	.5/ 9.8	0.0/****
	7.6	.0/ 8.7	3.1/ 8.7	4.8/ 8.7	5.8/ 9.0	5.8/ 8.7	4.9/ 8.5	3.8/ 8.1	2.9/ 8.3	2.2/ 9.0	1.7/ 9.5	1.2/ 9.8	.7/10.5	0.0/****
	8.4	.0/ 8.7	3.4/ 8.7	5.1/ 8.7	6.0/ 8.7	6.5/ 9.2	6.5/ 9.0	5.9/ 9.0	5.0/ 9.0	4.0/ 9.0	3.3/ 9.5	2.4/ 9.5	1.4/10.5	0.0/****

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 28 - MONOB I, 0, 3, AND 6 KNOT PITCH ANGLES FOR LONG CRESTED JONSWAP SEAS

RMS PITCH IN DEGREES/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

(AT SIGNIFICANT WAVE HEIGHTS, IN FEET, OF 2.42, 4.64, 5.45, 7.48, 8.30, 9.70, 10.20, 13.13, RESPECTIVELY)

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3.9	.2/ 3.9	.2/ 3.9	.3/ 4.8	.3/ 4.8	.5/ 4.5	.5/ 4.5	.1/ 4.5	.4/ 3.9	.5/ 4.5	.3/ 4.8	.3/ 4.8	.2/ 3.9	.2/ 3.9
	4.8	.7/ 5.2	.8/ 5.2	1.0/ 4.8	1.4/ 4.8	1.7/ 4.8	1.3/ 4.8	.1/ 4.5	1.1/ 4.8	1.6/ 4.8	1.4/ 4.8	1.0/ 4.8	.8/ 5.2	.7/ 5.2
	5.5	[illegible]/ 5.7	1.4/ 5.7	1.6/ 5.7	1.8/ 5.2	1.9/ 5.2	1.3/ 5.2	.1/ 4.8	1.2/ 5.2	1.8/ 5.2	1.8/ 5.2	1.6/ 5.7	1.4/ 5.7	1.3/ 5.7
	6.3	2.1/ 6.3	2.1/ 6.3	2.2/ 6.3	2.3/ 6.3	2.2/ 6.3	1.5/ 6.3	.1/ 4.5	1.3/ 6.3	2.1/ 6.3	2.3/ 6.3	2.2/ 6.3	2.1/ 6.3	2.1/ 6.3
	7.0	2.3/ 6.7	2.3/ 6.7	2.4/ 6.7	2.4/ 6.7	2.2/ 6.7	1.4/ 4.8	.1/ 4.5	1.3/ 6.7	2.1/ 6.7	2.3/ 6.7	2.4/ 6.7	2.3/ 6.7	2.3/ 6.7
	7.2	2.7/ 7.1	2.7/ 7.1	2.7/ 7.1	2.6/ 7.1	2.4/ 7.1	1.6/ 4.8	.1/ 4.5	1.4/ 7.0	2.3/ 7.1	2.6/ 7.1	2.7/ 7.1	2.7/ 7.1	2.7/ 7.1
	7.6	2.7/ 7.7	2.7/ 7.7	2.7/ 7.7	2.6/ 7.5	2.3/ 7.5	1.5/ 4.8	.1/ 4.5	1.4/ 7.5	2.2/ 7.5	2.6/ 7.5	2.7/ 7.7	2.7/ 7.7	2.7/ 7.7
	8.4	3.2/ 8.5	3.2/ 8.5	3.1/ 8.5	2.9/ 8.3	2.6/ 8.3	1.6/ 4.8	.1/ 4.5	1.5/ 8.3	2.5/ 8.3	2.9/ 8.5	3.1/ 8.5	3.2/ 8.5	3.2/ 8.5
3	3.9	.3/ 5.2	.3/ 5.2	.3/ 4.8	.4/ 5.2	.7/ 4.5	.6/ 4.2	.1/ 4.5	.4/ 4.5	.3/ 4.8	.3/ 5.2	.2/ 5.2	.2/ 5.2	.1/ 5.2
	4.8	.6/ 6.4	.7/ 6.3	.8/ 6.3	1.2/ 5.7	1.6/ 5.2	1.2/ 4.8	.2/ 4.8	1.2/ 4.8	1.5/ 4.8	1.2/ 5.2	1.0/ 5.2	.8/ 5.7	.7/ 5.7
	5.5	1.0/ 6.7	1.1/ 6.7	1.3/ 6.4	1.5/ 6.3	1.7/ 5.7	1.3/ 5.7	.2/ 4.8	1.2/ 5.2	1.9/ 5.2	1.9/ 5.2	1.8/ 5.7	1.6/ 5.7	1.5/ 5.7
	6.3	1.7/ 7.5	1.8/ 7.3	1.9/ 7.3	2.0/ 7.0	2.0/ 6.5	1.4/ 6.3	.2/ 4.8	1.4/ 6.3	2.2/ 6.3	2.5/ 6.3	2.6/ 6.3	2.6/ 6.3	2.6/ 6.3
	7.0	2.0/ 8.1	2.0/ 8.1	2.0/ 7.7	2.1/ 7.5	2.0/ 7.1	1.4/ 6.8	.2/ 4.8	1.3/ 4.8	2.2/ 6.7	2.6/ 6.7	2.7/ 6.7	2.8/ 6.7	2.8/ 6.7
	7.2	2.3/ 8.3	2.3/ 8.3	2.3/ 8.1	2.3/ 7.9	2.2/ 7.7	1.5/ 7.3	.2/ 4.8	1.5/ 4.8	2.4/ 7.0	2.8/ 7.1	3.0/ 7.1	3.1/ 7.1	3.1/ 7.1
	7.6	2.4/ 8.7	2.4/ 8.7	2.3/ 8.5	2.3/ 8.3	2.1/ 8.1	1.5/ 7.9	.2/ 4.8	1.4/ 4.8	2.3/ 7.5	2.8/ 7.5	3.0/ 7.5	3.1/ 7.7	3.1/ 7.7
	8.4	2.9/ 9.5	2.8/ 9.5	2.8/ 9.2	2.6/ 9.2	2.4/ 9.0	1.6/ 5.2	.2/ 4.8	1.5/ 4.8	2.6/ 8.3	3.1/ 8.3	3.4/ 8.3	3.6/ 8.5	3.6/ 8.5
6	3.9	.1/ 7.9	.1/ 7.7	.2/ 6.8	.3/ 6.4	.7/ 5.2	.7/ 4.5	.1/ 4.5	.3/ 4.8	.3/ 5.2	.2/ 5.2	.1/ 5.7	.1/ 5.7	.1/ 5.7
	4.8	.5/ 8.3	.5/ 8.1	.7/ 7.5	.9/ 6.8	1.3/ 5.7	1.2/ 5.2	.4/ 4.8	1.2/ 4.8	1.3/ 5.2	1.0/ 5.7	.8/ 5.7	.7/ 5.7	.6/ 6.3
	5.5	.9/ 8.5	.9/ 8.3	1.0/ 7.9	1.3/ 7.3	1.5/ 6.5	1.3/ 5.7	.3/ 4.8	1.4/ 5.2	1.9/ 5.2	1.9/ 5.7	1.7/ 5.7	1.5/ 5.7	1.4/ 5.7
	6.3	1.5/ 9.0	1.5/ 9.0	1.6/ 8.5	1.7/ 8.1	1.8/ 7.3	1.4/ 6.5	.3/ 4.8	1.5/ 5.2	2.3/ 6.3	2.8/ 6.3	2.9/ 6.3	2.9/ 6.3	2.8/ 6.3
	7.0	1.7/ 9.5	1.8/ 9.5	1.8/ 9.0	1.8/ 8.5	1.8/ 7.9	1.4/ 7.1	.3/ 4.8	1.4/ 5.2	2.3/ 6.5	2.8/ 6.5	3.0/ 6.7	3.1/ 6.7	3.1/ 6.7
	7.2	2.1/ 9.8	2.1/ 9.8	2.1/ 9.2	2.1/ 8.7	2.0/ 8.3	1.5/ 7.7	.3/ 4.8	1.6/ 5.2	2.5/ 7.0	3.0/ 7.0	3.3/ 7.0	3.5/ 7.1	3.5/ 7.1
	7.6	2.1/10.1	2.1/10.1	2.1/ 9.8	2.1/ 9.2	2.0/ 8.7	1.5/ 8.1	.3/ 4.8	1.5/ 5.2	2.4/ 7.5	3.0/ 7.5	3.3/ 7.5	3.4/ 7.5	3.5/ 7.5
	8.4	2.6/10.8	2.6/10.8	2.5/10.5	2.4/10.1	2.2/ 9.5	1.6/ 9.0	.3/ 4.8	1.6/ 5.2	2.7/ 5.7	3.3/ 8.3	3.7/ 8.3	3.9/ 8.3	4.0/ 8.3

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 29 - MONOB I, 0, 3, AND 6 KNOT VERTICAL DISPLACEMENTS AT THE CG (HEAVE) FOR LONG CRESTED JONSWAP SEAS

MONOB I

JONSWAP LONG CRESTED

RMS VER DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

(AT SIGNIFICANT WAVE HEIGHTS, IN FEET, OF 2.42, 4.64, 5.45, 7.48, 8.30, 9.70, 10.20, 13.13, RESPECTIVELY)

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3.9	.1/ 4.5	.1/ 4.5	.1/ 4.5	.1/ 3.9	.2/ 4.8	.3/ 4.8	.4/ 4.5	.3/ 4.5	.2/ 4.8	.1/ 5.2	.1/ 4.5	.1/ 4.5	.1/ 4.5
	4.8	.3/ 4.8	.3/ 4.8	.3/ 4.5	.3/ 5.2	.7/ 4.8	1.2/ 4.8	1.5/ 4.8	1.3/ 4.8	.8/ 4.8	.4/ 5.2	.3/ 4.5	.3/ 4.8	.3/ 4.8
	5.5	.4/ 6.5	.4/ 6.3	.4/ 5.7	.7/ 5.7	1.1/ 5.7	1.5/ 5.2	1.8/ 5.2	1.6/ 5.2	1.1/ 5.2	.7/ 5.7	.5/ 5.7	.4/ 6.3	.4/ 6.3
	6.3	.8/ 6.5	.8/ 6.5	.9/ 6.3	1.2/ 6.3	1.6/ 6.3	2.1/ 6.3	2.3/ 6.3	2.1/ 6.3	1.7/ 6.3	1.3/ 6.3	1.0/ 6.3	.8/ 6.5	.8/ 6.5
	7.0	1.1/ 7.0	1.1/ 7.0	1.3/ 7.0	1.5/ 7.0	1.9/ 7.0	2.2/ 7.0	2.4/ 7.0	2.3/ 7.0	1.9/ 7.0	1.5/ 7.0	1.3/ 7.0	1.1/ 7.0	1.1/ 7.0
	7.2	1.4/ 7.3	1.5/ 7.3	1.6/ 7.3	1.9/ 7.3	2.2/ 7.3	2.6/ 7.3	2.8/ 7.1	2.6/ 7.3	2.3/ 7.3	1.9/ 7.3	1.6/ 7.3	1.5/ 7.3	1.4/ 7.3
	7.6	1.6/ 7.9	1.7/ 7.9	1.8/ 7.9	2.0/ 7.9	2.4/ 7.7	2.7/ 7.7	2.9/ 7.7	2.7/ 7.7	2.4/ 7.7	2.1/ 7.9	1.8/ 7.9	1.7/ 7.9	1.7/ 7.9
	8.4	2.4/ 9.0	2.5/ 9.0	2.6/ 9.0	2.8/ 9.0	3.1/ 8.5	3.4/ 8.5	3.6/ 8.5	3.5/ 8.5	3.2/ 8.5	2.8/ 9.0	2.6/ 9.0	2.5/ 9.0	2.4/ 9.0
3	3.9	.1/ 5.7	.1/ 5.7	.1/ 4.8	.1/ 4.8	.1/ 5.2	.3/ 4.8	.4/ 4.5	.3/ 4.8	.2/ 5.2	.1/ 5.2	.1/ 5.7	.0/ 4.5	.0/ 4.5
	4.8	.2/ 5.7	.2/ 5.7	.2/ 7.0	.3/ 6.3	.7/ 5.7	1.2/ 5.2	1.5/ 4.8	1.3/ 4.8	.8/ 5.2	.5/ 5.2	.3/ 5.7	.3/ 5.7	.2/ 5.7
	5.5	.3/ 7.7	.3/ 7.1	.4/ 6.7	.6/ 6.4	1.0/ 6.3	1.4/ 5.7	1.8/ 5.2	1.7/ 5.2	1.3/ 5.2	.9/ 5.7	.7/ 5.7	.5/ 5.7	.5/ 5.7
	6.3	.7/ 7.7	.7/ 7.7	.9/ 7.3	1.1/ 7.1	1.5/ 6.8	2.0/ 6.5	2.3/ 6.3	2.2/ 6.3	1.9/ 6.3	1.5/ 6.3	1.2/ 6.3	1.1/ 6.3	1.0/ 6.3
	7.0	1.0/ 8.1	1.0/ 8.1	1.2/ 7.9	1.4/ 7.7	1.7/ 7.5	2.2/ 7.1	2.4/ 7.0	2.4/ 7.0	2.1/ 7.0	1.8/ 7.0	1.5/ 7.0	1.4/ 7.0	1.3/ 7.0
	7.2	1.3/ 8.5	1.4/ 8.5	1.5/ 8.3	1.8/ 8.1	2.1/ 7.9	2.5/ 7.5	2.8/ 7.1	2.7/ 7.1	2.4/ 7.3	2.1/ 7.3	1.9/ 7.3	1.7/ 7.3	1.6/ 7.3
	7.6	1.5/ 9.0	1.6/ 9.0	1.7/ 8.7	1.9/ 8.5	2.3/ 8.3	2.6/ 7.9	2.9/ 7.7	2.8/ 7.7	2.6/ 7.7	2.3/ 7.9	2.0/ 7.9	1.9/ 7.9	1.8/ 7.9
	8.4	2.3/ 9.8	2.4/ 9.8	2.5/ 9.8	2.7/ 9.5	3.0/ 9.0	3.4/ 8.7	3.6/ 8.5	3.6/ 8.5	3.3/ 8.5	3.0/ 9.0	2.8/ 9.0	2.7/ 9.0	2.6/ 9.0
6	3.9	.0/ 7.9	.0/ 7.7	.1/ 6.8	.1/ 7.0	.2/ 5.7	.4/ 4.8	.4/ 4.5	.3/ 4.8	.1/ 5.2	.1/ 5.7	.1/ 5.7	.0/ 5.7	.0/ 5.7
	4.8	.1/ 7.9	.1/ 8.7	.2/ 8.3	.3/ 7.0	.6/ 6.3	1.1/ 5.2	1.4/ 4.8	1.3/ 4.8	.8/ 5.2	.5/ 5.7	.4/ 5.7	.3/ 6.3	.3/ 6.3
	5.5	.3/ 9.0	.3/ 8.7	.4/ 8.1	.6/ 7.5	.9/ 6.7	1.4/ 5.7	1.7/ 5.2	1.8/ 5.2	1.5/ 5.7	1.1/ 5.7	.8/ 5.7	.6/ 6.3	.6/ 6.3
	6.3	.7/ 9.2	.7/ 9.0	.8/ 8.7	1.1/ 8.1	1.4/ 7.5	1.9/ 6.8	2.2/ 6.3	2.3/ 6.3	2.1/ 6.3	1.9/ 6.3	1.7/ 6.3	1.5/ 6.3	1.4/ 6.3
	7.0	1.0/ 9.8	1.0/ 9.5	1.1/ 9.2	1.3/ 8.7	1.7/ 8.1	2.1/ 7.5	2.4/ 7.0	2.5/ 7.0	2.3/ 7.0	2.1/ 7.0	1.9/ 6.7	1.8/ 6.7	1.7/ 6.7
	7.2	1.3/10.1	1.3/ 9.8	1.4/ 9.5	1.7/ 9.0	2.0/ 8.5	2.4/ 7.9	2.8/ 7.1	2.8/ 7.1	2.7/ 7.1	2.4/ 7.1	2.2/ 7.3	2.1/ 7.3	2.1/ 7.3
	7.6	1.5/10.5	1.5/10.1	1.7/ 9.8	1.9/ 9.5	2.2/ 8.7	2.5/ 8.3	2.9/ 7.7	2.9/ 7.7	2.8/ 7.7	2.6/ 7.7	2.4/ 7.7	2.3/ 7.7	2.2/ 7.7
	8.4	2.2/11.2	2.3/11.2	2.4/10.8	2.6/10.5	2.9/ 9.5	3.3/ 9.0	3.6/ 8.5	3.6/ 8.5	3.5/ 8.5	3.3/ 8.5	3.1/ 9.0	3.0/ 9.0	3.0/ 9.0

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 30 - MONOB I, 0, 3, AND 6 KNOT LONGITUDINAL DISPLACEMENTS AT THE CABLE SHEAVE FOR LONG CRESTED JONSWAP SEAS

MONOB I

JONSWAP LONG CRESTED

RMS LON DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

(AT SIGNIFICANT WAVE HEIGHTS, IN FEET, OF 2.42, 4.64, 5.45, 7.48, 8.30, 9.70, 10.20, 13.13, RESPECTIVELY)
CABLE SHEAVE - 39.25 FT AFT OF FP, 18.7 FT TO PORT OF CL, AND 24.9 FT ABOVE BL

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3.9	.0/ 3.9	.0/ 3.9	.0/ 3.9	.0/ 5.2	.1/ 4.8	.1/ 3.9	.0/ 4.5	.0/ 3.9	.0/ 3.9	.0/ 4.8	.0/ 3.9	.0/ 3.9	.0/ 3.9
	4.8	.1/ 6.3	.1/ 6.3	.1/ 5.2	.2/ 5.2	.2/ 4.8	.2/ 4.8	.1/ 4.8	.1/ 4.8	.1/ 4.8	.1/ 4.8	.1/ 5.7	.1/ 6.3	.1/ 6.3
	5.5	.3/ 5.7	.3/ 5.7	.3/ 5.7	.4/ 5.7	.4/ 5.7	.3/ 5.7	.2/ 8.3	.1/ 8.3	.2/ 5.7	.2/ 5.7	.2/ 5.7	.2/ 5.7	.3/ 5.7
	6.3	.6/ 6.5	.7/ 6.5	.6/ 8.5	.9/ 8.3	.9/ 8.3	.7/ 8.3	.6/ 8.5	.4/ 8.5	.4/ 8.5	.4/ 8.5	.4/ 9.0	.5/ 6.3	.6/ 6.5
	7.0	.8/ 7.0	1.0/ 7.0	.8/ 8.5	1.3/ 8.3	1.2/ 8.3	1.1/ 8.3	.9/ 8.5	.8/ 8.5	.7/ 8.5	.7/ 9.0	.6/ 9.0	.7/ 7.0	.8/ 7.0
	7.2	1.1/ 7.3	1.3/ 8.3	1.1/ 8.5	1.7/ 8.3	1.6/ 8.3	1.5/ 8.3	1.3/ 8.5	1.1/ 8.5	1.0/ 8.5	1.0/ 9.0	.9/ 9.0	.9/ 9.0	1.1/ 7.3
	7.6	1.2/ 7.9	1.6/ 8.3	1.4/ 8.5	2.1/ 8.3	2.1/ 8.3	1.9/ 8.3	1.7/ 8.5	1.6/ 8.5	1.5/ 8.5	1.3/ 8.5	1.1/ 9.0	1.0/ 9.0	1.2/ 7.9
	8.4	1.8/ 9.0	2.2/ 8.5	2.2/ 8.5	3.1/ 8.5	3.0/ 8.5	3.0/ 8.5	2.9/ 8.5	2.9/ 8.5	2.8/ 9.0	2.7/ 9.0	2.3/ 9.0	1.8/ 9.0	1.8/ 9.0
3	3.9	.1/ 5.2	.1/ 5.2	.1/ 4.8	.1/ 5.7	.1/ 5.2	.1/ 4.2	.0/ 4.8	.0/ 3.9	.0/ 3.9	.0/ 4.8	.0/ 3.9	.0/ 3.9	.0/ 3.9
	4.8	.2/ 7.1	.2/ 7.1	.3/ 7.0	.3/ 5.7	.3/ 5.7	.2/ 5.2	.1/ 4.8	.1/ 4.8	.1/ 4.8	.1/ 4.8	.1/ 5.2	.1/ 6.3	.1/ 6.3
	5.5	.4/ 7.0	.5/ 6.8	.6/ 6.7	.5/ 6.3	.5/ 6.3	.4/ 5.7	.2/ 5.7	.1/ 5.2	.1/ 5.7	.2/ 5.7	.2/ 5.7	.2/ 5.7	.2/ 5.7
	6.3	.8/ 7.5	1.0/ 8.5	1.2/ 7.5	.9/ 7.1	1.0/ 6.8	.7/ 6.8	.5/ 8.3	.3/ 8.5	.3/ 9.0	.3/ 6.3	.3/ 6.3	.4/ 6.5	.5/ 6.5
	7.0	1.1/ 8.1	1.5/ 8.5	1.6/ 8.1	1.2/ 8.1	1.3/ 7.7	1.0/ 7.5	.7/ 8.3	.5/ 9.0	.4/ 9.0	.4/ 9.0	.5/ 7.0	.6/ 7.0	.7/ 7.0
	7.2	1.4/ 8.5	1.9/ 8.5	2.0/ 8.3	1.6/ 8.3	1.7/ 8.1	1.4/ 8.1	1.0/ 8.3	.7/ 9.0	.6/ 9.0	.6/ 9.5	.6/ 9.8	.7/ 7.3	.9/ 7.3
	7.6	1.6/ 9.0	1.9/ 8.5	2.0/ 8.5	1.8/ 8.5	2.0/ 8.3	1.7/ 8.3	1.3/ 8.3	1.0/ 9.0	.8/ 9.0	.8/ 9.5	.8/ 9.8	.9/ 9.8	1.0/ 7.9
	8.4	2.3/ 9.8	2.2/ 8.5	2.0/ 8.5	1.8/ 8.7	2.2/ 8.7	2.2/ 8.7	2.1/ 8.5	1.8/ 9.0	1.7/ 9.0	1.6/ 9.5	1.5/ 9.8	1.5/ 9.8	1.5/ 9.0
6	3.9	.1/ 7.9	.2/ 7.7	.2/ 6.8	.1/ 6.8	.1/ 5.7	.1/ 4.5	.0/ 4.8	.0/ 3.9	.0/ 3.9	.0/ 4.8	.0/ 5.2	.0/ 3.9	.0/ 3.9
	4.8	.3/ 8.7	.5/ 8.5	.5/ 8.3	.5/ 7.0	.4/ 6.3	.2/ 5.7	.1/ 4.8	.1/ 4.8	.1/ 4.8	.1/ 4.8	.1/ 5.7	.1/ 5.7	.1/ 5.7
	5.5	.6/ 8.7	.9/ 8.5	1.0/ 8.1	.9/ 7.5	.7/ 6.7	.3/ 6.3	.2/ 5.7	.1/ 5.7	.1/ 5.2	.2/ 5.7	.2/ 5.7	.2/ 5.7	.2/ 5.7
	6.3	1.2/ 9.2	1.3/ 8.5	1.7/ 8.5	1.6/ 8.1	1.1/ 7.5	.6/ 7.1	.4/ 8.1	.2/ 8.5	.2/ 6.3	.3/ 6.3	.3/ 6.3	.3/ 6.5	.4/ 6.5
	7.0	1.5/ 9.5	1.4/ 8.5	1.6/ 8.5	1.7/ 8.5	1.4/ 8.1	.8/ 7.7	.6/ 7.1	.4/ 9.0	.3/ 9.5	.3/ 7.0	.4/ 7.0	.4/ 7.0	.5/ 7.0
	7.2	1.9/ 9.8	1.7/ 9.8	1.7/ 8.5	1.9/ 8.7	1.7/ 8.3	1.0/ 8.1	.8/ 7.7	.5/ 9.0	.4/ 9.5	.4/ 7.3	.5/ 7.3	.6/ 7.5	.7/ 7.5
	7.6	2.2/10.5	1.9/10.1	1.7/ 8.5	1.7/ 8.7	1.7/ 8.5	1.2/ 8.5	1.0/ 8.1	.7/ 9.0	.6/ 9.5	.5/ 9.8	.6/ 7.9	.7/ 7.9	.8/ 7.9
	8.4	3.0/11.2	2.7/11.2	2.3/10.8	1.9/ 8.5	1.7/ 8.7	1.5/ 9.0	1.6/ 9.0	1.3/ 9.0	1.1/ 9.5	1.0/ 9.8	1.0/10.5	1.0/10.5	1.2/ 9.0

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 31 - MONOB I, 0, 3, AND 6 KNOT LATERAL DISPLACEMENTS AT THE CABLE SHEAVE FOR LONG CRESTED JONSWAP SEAS

MONOB I

JONSWAP LONG CRESTED

RMS LAT DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

(AT SIGNIFICANT WAVE HEIGHTS, IN FEET, OF 2.42, 4.64, 5.45, 7.48, 8.30, 9.70, 10.20, 13.13, RESPECTIVELY)
CABLE SHEAVE - 39.25 FT AFT OF FP, 18.7 FT TO PORT OF CL, AND 24.9 FT ABOVE BL

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3.9	.0/ 3.9	.0/ 3.9	.1/ 3.9	.1/ 4.8	.2/ 3.9	.3/ 3.9	.3/ 3.9	.2/ 3.9	.2/ 3.9	.1/ 4.8	.1/ 5.2	.0/ 3.9	0.0/****
	4.8	.0/ 5.7	.1/ 5.7	.2/ 5.2	.4/ 4.8	.6/ 4.8	.7/ 4.8	.7/ 4.8	.7/ 4.8	.6/ 4.8	.4/ 4.8	.2/ 5.2	.1/ 5.2	0.0/****
	5.5	.0/ 5.7	.2/ 5.7	.4/ 5.7	.7/ 5.7	.9/ 5.7	1.0/ 5.7	1.0/ 5.7	1.0/ 5.7	.8/ 5.7	.6/ 5.7	.4/ 5.7	.2/ 5.7	0.0/****
	6.3	.0/ 8.5	.4/ 8.5	.8/ 6.3	1.2/ 6.3	1.6/ 6.3	1.7/ 6.3	1.7/ 6.3	1.6/ 6.3	1.4/ 6.3	1.1/ 6.3	.8/ 6.3	.4/ 8.5	0.0/****
	7.0	.0/ 8.5	.6/ 8.5	1.2/ 8.5	1.6/ 7.0	2.0/ 7.0	2.2/ 7.0	2.2/ 7.0	2.0/ 7.0	1.8/ 7.0	1.5/ 7.0	1.1/ 8.3	.6/ 8.5	0.0/****
	7.2	.0/ 8.5	.8/ 8.5	1.6/ 8.3	2.2/ 8.3	2.6/ 7.5	2.8/ 7.5	2.8/ 7.5	2.6/ 7.5	2.3/ 7.5	1.9/ 7.5	1.4/ 8.3	.8/ 8.5	0.0/****
	7.6	.0/ 8.5	1.1/ 8.5	2.0/ 8.3	2.6/ 8.3	3.1/ 8.3	3.2/ 8.3	3.2/ 8.1	3.0/ 8.1	2.7/ 8.3	2.3/ 8.3	1.7/ 8.3	1.0/ 8.5	0.0/****
	8.4	.0/ 8.5	1.7/ 8.5	2.9/ 8.5	3.7/ 8.5	4.2/ 8.5	4.3/ 8.5	4.2/ 8.5	3.9/ 8.3	3.5/ 8.5	3.1/ 8.5	2.4/ 8.5	1.5/ 8.5	0.0/****
3	3.9	.0/ 5.2	.0/ 5.2	.1/ 4.8	.1/ 5.7	.2/ 4.5	.3/ 4.2	.3/ 3.9	.2/ 3.9	.2/ 3.9	.1/ 4.8	.0/ 5.2	.0/ 3.9	0.0/****
	4.8	.0/ 8.5	.1/ 6.8	.3/ 6.3	.5/ 5.7	.7/ 5.2	.8/ 5.2	.7/ 4.8	.6/ 4.8	.5/ 4.8	.3/ 4.8	.2/ 5.2	.1/ 5.2	0.0/****
	5.5	.0/ 8.5	.3/ 8.5	.6/ 6.7	.9/ 6.3	1.1/ 6.3	1.1/ 5.7	1.0/ 5.7	.9/ 5.7	.7/ 5.7	.5/ 5.7	.3/ 5.7	.2/ 5.7	0.0/****
	6.3	.0/ 8.5	.7/ 8.5	1.2/ 8.5	1.5/ 7.1	1.8/ 6.8	1.8/ 6.5	1.7/ 6.3	1.5/ 6.3	1.2/ 6.3	.9/ 6.3	.6/ 6.3	.3/ 6.3	0.0/****
	7.0	.0/ 8.5	1.0/ 8.5	1.6/ 8.3	2.0/ 7.9	2.2/ 7.5	2.2/ 7.3	2.0/ 7.0	1.8/ 7.0	1.5/ 7.0	1.2/ 7.0	.8/ 7.0	.4/ 7.0	0.0/****
	7.2	.0/ 8.5	1.3/ 8.5	2.1/ 8.5	2.6/ 8.3	2.8/ 8.1	2.7/ 7.7	2.5/ 7.5	2.2/ 7.3	1.9/ 7.3	1.5/ 7.3	1.0/ 7.3	.5/ 7.3	0.0/****
	7.6	.0/ 8.5	1.4/ 8.5	2.2/ 8.5	2.8/ 8.5	3.0/ 8.3	3.0/ 8.1	2.8/ 7.9	2.4/ 7.9	2.1/ 7.9	1.7/ 7.9	1.1/ 7.9	.6/ 7.9	0.0/****
	8.4	.0/ 8.5	1.3/ 8.7	2.2/ 8.5	3.0/ 8.7	3.4/ 8.5	3.6/ 8.5	3.5/ 8.3	3.1/ 8.5	2.8/ 8.5	2.3/ 9.0	1.6/ 9.0	.9/ 9.0	0.0/****
6	3.9	.0/ 8.7	.1/ 7.7	.1/ 6.8	.2/ 6.7	.3/ 5.2	.3/ 4.5	.3/ 3.9	.2/ 3.9	.1/ 3.9	.1/ 4.8	.0/ 5.2	.0/ 5.2	0.0/****
	4.8	.0/ 8.7	.4/ 8.5	.6/ 8.3	.7/ 6.8	.9/ 6.3	.9/ 5.2	.7/ 4.8	.6/ 4.8	.4/ 4.8	.3/ 4.8	.1/ 5.2	.1/ 5.7	0.0/****
	5.5	.0/ 8.7	.8/ 8.5	1.1/ 8.1	1.2/ 7.3	1.3/ 6.7	1.2/ 6.3	1.0/ 5.7	.8/ 5.7	.7/ 5.7	.5/ 5.7	.3/ 5.7	.1/ 5.7	0.0/****
	6.3	.0/ 8.7	1.2/ 8.7	2.0/ 8.5	2.1/ 8.1	2.0/ 7.5	1.9/ 6.8	1.6/ 6.3	1.3/ 6.3	1.1/ 6.3	.8/ 6.3	.5/ 6.3	.2/ 6.3	0.0/****
	7.0	.0/ 8.7	1.1/ 8.7	2.0/ 8.7	2.4/ 8.5	2.4/ 8.1	2.2/ 7.5	1.9/ 7.0	1.6/ 7.0	1.3/ 7.0	1.0/ 7.0	.7/ 7.0	.3/ 7.0	0.0/****
	7.2	.0/ 8.7	1.1/ 8.7	2.0/ 8.7	2.7/ 8.7	2.9/ 8.3	2.7/ 7.9	2.3/ 7.3	2.0/ 7.3	1.6/ 7.3	1.2/ 7.3	.8/ 7.3	.4/ 7.3	0.0/****
	7.6	.0/ 8.7	1.1/ 8.7	1.9/ 8.7	2.5/ 8.7	2.9/ 8.5	2.8/ 8.3	2.5/ 7.9	2.2/ 7.9	1.8/ 7.9	1.4/ 7.9	1.0/ 7.9	.5/ 7.9	0.0/****
	8.4	.0/ 8.7	1.3/ 8.7	2.1/ 8.5	2.7/ 8.7	3.1/ 8.7	3.2/ 8.7	3.2/ 8.3	2.9/ 8.5	2.4/ 9.0	2.0/ 9.0	1.4/ 9.0	.7/ 9.0	0.0/****

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. FOOT = 0.305 METRES

TABLE 32 - MONOB I, 0, 3, AND 6 KNOT VERTICAL DISPLACEMENTS AT THE CABLE SHEAVE FOR LONG CRESTED JONSWAP SEAS

MONOB I

JONSWAP LONG CRESTED

RMS VER DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

(AT SIGNIFICANT WAVE HEIGHTS, IN FEET, OF 2.42, 4.64, 5.45, 7.48, 8.30, 9.70, 10.20, 13.13, RESPECTIVELY)
CABLE SHEAVE - 39.25 FT AFT OF FP, 18.7 FT TO PORT OF CL, AND 24.9 FT ABOVE BL

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3.9	.2/ 3.9	.2/ 3.9	.3/ 4.8	.3/ 4.5	.5/ 4.5	.6/ 4.5	.5/ 4.5	.5/ 4.5	.4/ 4.5	.2/ 4.8	.2/ 3.9	.2/ 3.9	.2/ 3.9
	4.8	.7/ 5.2	.8/ 4.8	.9/ 4.8	1.2/ 4.8	1.5/ 4.8	1.6/ 4.8	1.6/ 4.8	1.6/ 4.8	1.5/ 4.8	1.1/ 4.8	.8/ 5.2	.6/ 5.2	.6/ 5.2
	5.5	1.1/ 5.7	1.2/ 5.7	1.3/ 5.7	1.5/ 5.2	1.8/ 5.2	1.9/ 5.2	1.9/ 5.2	1.9/ 5.2	1.9/ 5.2	1.6/ 5.7	1.3/ 5.7	1.1/ 5.7	1.0/ 5.7
	6.3	1.9/ 6.3	1.8/ 6.3	1.9/ 6.3	2.1/ 6.3	2.4/ 6.3	2.5/ 6.3	2.6/ 6.3	2.7/ 6.3	2.7/ 6.3	2.5/ 6.3	2.2/ 6.3	1.9/ 6.3	1.7/ 6.3
	7.0	2.1/ 7.0	2.1/ 7.0	2.2/ 7.0	2.4/ 7.0	2.7/ 7.0	2.9/ 7.0	3.0/ 7.0	3.1/ 7.0	3.1/ 7.0	2.9/ 7.0	2.7/ 7.0	2.3/ 7.0	2.1/ 7.0
	7.2	2.6/ 7.3	2.4/ 7.1	2.7/ 7.1	3.0/ 8.5	3.3/ 8.5	3.5/ 8.5	3.7/ 8.3	3.8/ 8.3	3.8/ 7.3	3.6/ 7.3	3.3/ 7.3	2.9/ 7.3	2.5/ 7.3
	7.6	2.7/ 7.7	2.6/ 7.7	3.0/ 8.5	3.4/ 8.5	3.8/ 8.5	4.1/ 8.3	4.3/ 8.3	4.4/ 8.3	4.4/ 8.3	4.2/ 8.3	3.8/ 8.3	3.2/ 8.3	2.6/ 7.7
	8.4	3.5/ 8.5	3.7/ 9.0	4.6/ 9.0	5.4/ 9.0	5.9/ 8.5	6.2/ 8.5	6.3/ 8.5	6.4/ 8.5	6.2/ 8.5	5.9/ 8.5	5.2/ 8.5	4.3/ 8.5	3.4/ 8.5
3	3.9	.2/ 5.2	.2/ 5.2	.3/ 4.8	.4/ 4.8	.6/ 4.5	.6/ 4.2	.5/ 4.5	.4/ 4.8	.3/ 4.8	.2/ 5.2	.1/ 5.2	.1/ 5.2	.1/ 5.2
	4.8	.5/ 6.3	.5/ 6.3	.6/ 5.7	.9/ 5.7	1.3/ 5.2	1.6/ 5.2	1.7/ 4.8	1.7/ 4.8	1.4/ 4.8	1.0/ 5.2	.7/ 5.2	.6/ 5.7	.5/ 5.7
	5.5	.9/ 6.8	.8/ 6.7	.9/ 6.4	1.2/ 6.3	1.5/ 5.7	1.8/ 5.7	2.0/ 5.2	2.1/ 5.2	2.0/ 5.2	1.7/ 5.7	1.4/ 5.7	1.2/ 5.7	1.1/ 5.7
	6.3	1.5/ 7.5	1.5/ 8.7	1.6/ 8.7	1.9/ 7.0	2.2/ 6.8	2.5/ 6.5	2.6/ 6.3	2.7/ 6.3	2.7/ 6.3	2.5/ 6.3	2.3/ 6.3	2.1/ 6.3	2.0/ 6.3
	7.0	1.8/ 8.1	1.9/ 8.7	2.2/ 8.5	2.4/ 8.5	2.7/ 7.5	2.9/ 7.3	3.0/ 7.0	3.1/ 7.0	3.0/ 7.0	2.8/ 7.0	2.6/ 7.0	2.4/ 7.0	2.3/ 7.0
	7.2	2.2/ 8.5	2.6/ 8.7	3.0/ 8.5	3.2/ 8.5	3.4/ 8.3	3.6/ 7.7	3.6/ 7.3	3.6/ 7.3	3.6/ 7.3	3.4/ 7.3	3.1/ 7.3	2.9/ 7.3	2.7/ 7.3
	7.6	2.4/ 8.7	3.1/ 8.7	3.6/ 8.7	3.9/ 8.7	4.0/ 8.5	4.1/ 8.3	4.1/ 8.1	4.0/ 7.9	3.9/ 7.9	3.6/ 7.9	3.4/ 7.9	3.1/ 7.7	2.8/ 7.7
	8.4	3.2/ 9.5	3.9/ 8.7	4.5/ 9.0	5.1/ 9.0	5.5/ 9.0	5.7/ 8.7	5.7/ 8.5	5.5/ 9.0	5.3/ 9.0	5.1/ 9.0	4.6/ 9.0	4.1/ 9.0	3.7/ 8.5
6	3.9	.1/ 7.9	.1/ 7.7	.2/ 6.8	.2/ 6.3	.4/ 5.2	.7/ 4.5	.5/ 4.5	.4/ 4.8	.2/ 5.2	.2/ 5.2	.1/ 5.7	.1/ 5.7	.1/ 5.7
	4.8	.4/ 8.3	.5/ 8.7	.5/ 8.5	.6/ 6.7	1.0/ 6.3	1.5/ 5.2	1.8/ 4.8	1.7/ 4.8	1.3/ 5.2	.9/ 5.7	.7/ 5.7	.5/ 5.7	.5/ 5.7
	5.5	.7/ 8.5	1.0/ 8.7	1.0/ 8.7	1.0/ 8.5	1.3/ 6.7	1.8/ 5.7	2.1/ 5.2	2.3/ 5.2	2.1/ 5.2	1.8/ 5.7	1.4/ 5.7	1.2/ 5.7	1.1/ 5.7
	6.3	1.3/ 9.2	2.1/ 8.7	2.4/ 8.7	2.1/ 8.5	2.2/ 7.5	2.5/ 6.8	2.7/ 6.3	2.9/ 6.3	2.9/ 6.3	2.8/ 6.3	2.6/ 6.3	2.4/ 6.3	2.3/ 6.3
	7.0	1.6/ 9.5	2.3/ 9.2	2.9/ 9.0	3.0/ 8.7	2.8/ 8.3	2.9/ 7.5	3.0/ 7.0	3.1/ 7.0	3.1/ 7.0	3.0/ 6.7	2.8/ 6.7	2.7/ 6.7	2.6/ 6.7
	7.2	2.0/ 9.8	2.7/ 9.5	3.3/ 9.2	3.7/ 9.0	3.6/ 8.5	3.6/ 8.1	3.6/ 7.3	3.6/ 7.3	3.6/ 7.3	3.5/ 7.1	3.3/ 7.1	3.1/ 7.1	3.0/ 7.1
	7.6	2.2/10.1	2.8/10.1	3.4/ 9.5	3.8/ 9.2	4.0/ 8.7	4.0/ 8.5	3.9/ 7.9	3.9/ 7.9	3.8/ 7.9	3.6/ 7.7	3.5/ 7.7	3.3/ 7.7	3.1/ 7.7
	8.4	3.0/11.2	3.5/10.8	4.1/10.5	4.5/10.1	4.9/ 9.5	5.2/ 9.0	5.3/ 8.5	5.2/ 9.0	5.0/ 9.0	4.8/ 9.0	4.5/ 9.0	4.2/ 9.0	3.9/ 8.5

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 33 - MONOB 1, 0, 3, AND 6 KNOT ROLL ANGLES FOR SHORT CRESTED JONSWAP SEAS

MONOB 1

JONSWAP SHORT CRESTED

RMS ROLL IN DEGREES/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

(AT SIGNIFICANT WAVE HEIGHTS, IN FEET, OF 2.42, 4.64, 5.45, 7.48, 8.30, 9.70, 10.20, 13.13, RESPECTIVELY)

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3.9	.0/ 3.9	.0/ 3.9	.1/ 3.9	.1/ 5.2	.1/ 5.2	.1/ 5.2	.1/ 5.2	.1/ 5.2	.1/ 5.2	.0/ 5.2	.0/ 5.2	.0/ 5.2	.0/ 5.2
	4.8	.2/ 6.3	.2/ 6.3	.2/ 5.2	.2/ 5.2	.3/ 5.2	.3/ 5.2	.3/ 5.2	.3/ 5.2	.3/ 5.2	.2/ 6.3	.2/ 6.3	.2/ 6.3	.2/ 6.3
	5.5	.4/ 8.3	.5/ 8.3	.5/ 8.3	.6/ 8.3	.6/ 8.3	.7/ 8.3	.7/ 8.3	.7/ 8.3	.6/ 8.3	.6/ 8.3	.5/ 8.3	.4/ 8.3	.4/ 8.3
	6.3	1.3/ 8.5	1.3/ 8.5	1.5/ 8.5	1.7/ 8.5	1.8/ 8.5	1.9/ 8.5	2.0/ 8.5	1.9/ 8.5	1.8/ 8.5	1.7/ 8.5	1.5/ 8.5	1.3/ 8.5	1.3/ 8.5
	7.0	2.1/ 8.5	2.2/ 8.5	2.4/ 8.5	2.7/ 8.5	2.9/ 8.5	3.1/ 8.5	3.1/ 8.5	3.1/ 8.5	2.9/ 8.5	2.7/ 8.5	2.4/ 8.5	2.2/ 8.5	2.1/ 8.5
	7.2	3.1/ 8.5	3.2/ 8.5	3.5/ 8.5	3.9/ 8.5	4.2/ 8.5	4.5/ 8.5	4.6/ 8.5	4.5/ 8.5	4.2/ 8.5	3.9/ 8.5	3.5/ 8.5	3.2/ 8.5	3.1/ 8.5
	7.6	4.2/ 8.5	4.4/ 8.5	4.8/ 8.5	5.3/ 8.5	5.8/ 8.5	6.1/ 8.5	6.2/ 8.5	6.1/ 8.5	5.8/ 8.5	5.3/ 8.5	4.8/ 8.5	4.4/ 8.5	4.2/ 8.5
	8.4	7.2/ 8.5	7.5/ 8.5	8.2/ 8.5	9.0/ 8.5	9.8/ 8.5	10.3/ 8.5	10.5/ 8.5	10.3/ 8.5	9.8/ 8.5	9.0/ 8.5	8.2/ 8.5	7.5/ 8.5	7.2/ 8.5
3	3.9	.1/ 5.2	.1/ 5.2	.1/ 5.2	.1/ 5.2	.1/ 4.8	.1/ 4.8	.1/ 4.8	.1/ 5.2	.0/ 5.2	.0/ 5.2	.0/ 5.2	.0/ 5.2	.0/ 5.2
	4.8	.3/ 7.1	.4/ 7.0	.4/ 6.8	.4/ 6.3	.4/ 5.7	.4/ 5.7	.3/ 5.7	.3/ 5.7	.2/ 5.7	.2/ 6.3	.1/ 6.3	.1/ 6.3	.1/ 6.3
	5.5	.8/ 8.5	.8/ 8.5	.8/ 8.5	.8/ 8.5	.8/ 8.5	.8/ 8.3	.7/ 8.3	.6/ 8.1	.5/ 7.7	.4/ 5.7	.3/ 5.7	.3/ 5.7	.2/ 5.7
	6.3	1.9/ 8.5	1.9/ 8.5	2.0/ 8.5	2.0/ 8.5	2.0/ 8.5	1.9/ 8.5	1.8/ 8.5	1.6/ 8.5	1.3/ 8.5	1.1/ 8.5	.9/ 8.5	.7/ 9.0	.6/ 9.0
	7.0	3.0/ 8.5	3.0/ 8.5	3.0/ 8.5	3.1/ 8.5	3.1/ 8.5	3.0/ 8.5	2.7/ 8.5	2.4/ 8.5	2.1/ 8.5	1.7/ 8.7	1.4/ 9.0	1.2/ 9.0	1.1/ 9.0
	7.2	4.2/ 8.5	4.3/ 8.5	4.3/ 8.5	4.4/ 8.5	4.4/ 8.5	4.2/ 8.5	3.9/ 8.5	3.5/ 8.5	3.0/ 8.5	2.5/ 8.7	2.0/ 9.0	1.7/ 9.0	1.6/ 9.0
	7.6	4.9/ 8.7	5.0/ 8.5	5.2/ 8.5	5.3/ 8.5	5.4/ 8.5	5.2/ 8.5	4.9/ 8.5	4.4/ 8.5	3.8/ 8.5	3.2/ 8.5	2.7/ 9.0	2.3/ 9.0	2.1/ 9.0
	8.4	5.5/ 8.7	5.7/ 8.7	6.2/ 8.7	6.8/ 8.7	7.2/ 8.7	7.4/ 8.7	7.3/ 8.7	7.0/ 9.0	6.4/ 9.0	5.6/ 9.0	4.9/ 9.0	4.3/ 9.0	4.1/ 9.0
6	3.9	.3/ 7.7	.3/ 7.7	.2/ 7.7	.2/ 7.7	.2/ 6.8	.2/ 6.8	.1/ 6.8	.1/ 6.8	.1/ 5.7	.0/ 5.2	.0/ 5.2	.0/ 5.2	.0/ 3.9
	4.8	1.1/ 8.5	1.1/ 8.5	1.0/ 8.5	.9/ 8.5	.8/ 8.5	.7/ 8.5	.6/ 8.5	.4/ 6.8	.3/ 6.8	.2/ 6.3	.1/ 6.3	.1/ 6.3	.1/ 6.3
	5.5	2.1/ 8.5	2.1/ 8.5	1.9/ 8.5	1.8/ 8.5	1.6/ 8.5	1.3/ 8.5	1.1/ 8.5	.8/ 8.3	.5/ 7.5	.4/ 6.8	.2/ 7.0	.2/ 5.7	.2/ 7.0
	6.3	3.7/ 8.7	3.7/ 8.7	3.5/ 8.7	3.3/ 8.7	3.1/ 8.5	2.7/ 8.5	2.2/ 8.5	1.7/ 8.5	1.2/ 8.3	.9/ 8.3	.6/ 8.3	.5/ 8.3	.4/ 8.3
	7.0	4.0/ 8.7	4.0/ 8.7	3.9/ 8.7	3.9/ 8.7	3.7/ 8.7	3.4/ 8.7	2.9/ 8.7	2.3/ 8.5	1.8/ 8.3	1.3/ 8.3	1.0/ 8.5	.7/ 9.0	.7/ 9.0
	7.2	4.4/ 8.7	4.4/ 8.7	4.5/ 8.7	4.5/ 8.7	4.4/ 8.7	4.1/ 8.7	3.7/ 8.7	3.1/ 8.5	2.4/ 8.5	1.8/ 8.3	1.4/ 8.1	1.1/ 9.0	1.0/ 9.5
	7.6	4.2/ 8.7	4.3/ 8.7	4.4/ 8.7	4.6/ 8.7	4.6/ 8.7	4.4/ 8.7	4.1/ 8.7	3.5/ 8.7	2.9/ 8.5	2.3/ 8.5	1.8/ 8.3	1.4/ 9.5	1.3/ 9.5
	8.4	4.5/ 8.7	4.6/ 8.7	5.0/ 8.7	5.3/ 8.7	5.5/ 8.7	5.6/ 9.0	5.4/ 9.0	5.0/ 9.0	4.4/ 9.0	3.7/ 9.0	3.1/ 9.0	2.6/ 9.0	2.4/ 9.5

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 34 - MONOB I, 0, 3, AND 6 KNOT PITCH ANGLES FOR SHORT CRESTED JONSWAP SEAS

MONOB I

JONSWAP SHORT CRESTED

RMS PITCH IN DEGREES/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

(AT SIGNIFICANT WAVE HEIGHTS, IN FEET, OF 2.42, 4.64, 5.45, 7.48, 8.30, 9.70, 10.20, 13.13, RESPECTIVELY)

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3.9	.3/ 4.8	.3/ 4.8	.3/ 4.5	.4/ 4.5	.4/ 4.5	.4/ 4.5	.4/ 4.5	.4/ 4.5	.4/ 4.5	.3/ 4.5	.3/ 4.8	.3/ 4.8	.3/ 4.8
	4.8	1.1/ 4.8	1.1/ 4.8	1.1/ 4.8	1.2/ 4.8	1.2/ 4.8	1.2/ 4.8	1.2/ 4.8	1.2/ 4.8	1.2/ 4.8	1.1/ 4.8	1.1/ 4.8	1.1/ 4.8	1.0/ 4.8
	5.5	1.6/ 5.7	1.6/ 5.7	1.5/ 5.2	1.5/ 5.2	1.5/ 5.2	1.5/ 5.2	1.5/ 5.2	1.5/ 5.2	1.5/ 5.2	1.5/ 5.2	1.5/ 5.2	1.5/ 5.7	1.5/ 5.7
	6.3	2.2/ 6.3	2.2/ 6.3	2.1/ 6.3	2.0/ 6.3	1.9/ 6.3	1.8/ 6.3	1.8/ 6.3	1.8/ 6.3	1.9/ 6.3	2.0/ 6.3	2.1/ 6.3	2.1/ 6.3	2.2/ 6.3
	7.0	2.3/ 6.7	2.3/ 6.7	2.2/ 6.7	2.1/ 6.7	2.0/ 6.7	1.9/ 6.7	1.8/ 6.7	1.8/ 6.7	1.9/ 6.7	2.1/ 6.7	2.2/ 6.7	2.3/ 6.7	2.3/ 6.7
	7.2	2.6/ 7.1	2.6/ 7.1	2.5/ 7.1	2.3/ 7.1	2.2/ 7.1	2.0/ 7.1	2.0/ 7.1	2.0/ 7.1	2.1/ 7.1	2.3/ 7.1	2.4/ 7.1	2.6/ 7.1	2.6/ 7.1
	7.6	2.6/ 7.7	2.6/ 7.7	2.5/ 7.7	2.3/ 7.7	2.2/ 7.7	2.0/ 7.5	1.9/ 7.5	2.0/ 7.5	2.1/ 7.7	2.3/ 7.7	2.4/ 7.7	2.6/ 7.7	2.6/ 7.7
	8.4	3.0/ 8.5	3.0/ 8.5	2.9/ 8.5	2.7/ 8.5	2.4/ 8.5	2.3/ 8.5	2.2/ 8.3	2.2/ 8.5	2.4/ 8.5	2.6/ 8.5	2.8/ 8.5	3.0/ 8.5	3.0/ 8.5
3	3.9	.4/ 5.2	.4/ 5.2	.4/ 4.5	.4/ 4.5	.4/ 4.5	.4/ 4.5	.4/ 4.5	.4/ 4.5	.3/ 4.5	.3/ 4.8	.2/ 5.2	.2/ 5.2	.2/ 5.2
	4.8	.9/ 5.7	.9/ 5.7	1.0/ 5.7	1.0/ 5.2	1.1/ 5.2	1.1/ 5.2	1.2/ 4.8	1.2/ 4.8	1.1/ 4.8	1.1/ 5.2	1.0/ 5.2	1.0/ 5.2	1.0/ 5.2
	5.5	1.3/ 6.5	1.3/ 6.5	1.3/ 6.5	1.3/ 6.4	1.3/ 6.3	1.4/ 5.7	1.4/ 5.7	1.5/ 5.2	1.6/ 5.7	1.6/ 5.7	1.7/ 5.7	1.7/ 5.7	1.7/ 5.7
	6.3	1.8/ 7.3	1.8/ 7.3	1.8/ 7.3	1.7/ 7.1	1.7/ 7.0	1.7/ 6.8	1.8/ 6.3	1.9/ 6.3	2.1/ 6.3	2.2/ 6.3	2.4/ 6.3	2.5/ 6.3	2.5/ 6.3
	7.0	2.0/ 7.7	2.0/ 7.7	1.9/ 7.7	1.8/ 7.7	1.8/ 7.7	1.7/ 7.5	1.8/ 7.0	1.9/ 6.7	2.1/ 6.7	2.3/ 6.7	2.5/ 6.7	2.6/ 6.7	2.7/ 6.7
	7.2	2.3/ 8.3	2.3/ 8.1	2.2/ 8.1	2.1/ 8.1	2.0/ 8.1	1.9/ 7.9	2.0/ 7.3	2.1/ 7.1	2.3/ 7.1	2.6/ 7.1	2.8/ 7.1	2.9/ 7.1	3.0/ 7.1
	7.6	2.3/ 8.5	2.3/ 8.5	2.2/ 8.5	2.1/ 8.5	2.0/ 8.5	1.9/ 8.3	1.9/ 7.9	2.1/ 7.7	2.3/ 7.5	2.5/ 7.5	2.7/ 7.5	2.9/ 7.5	2.9/ 7.5
	8.4	2.7/ 9.5	2.7/ 9.5	2.6/ 9.5	2.4/ 9.2	2.2/ 9.2	2.1/ 9.2	2.2/ 9.0	2.3/ 8.5	2.6/ 8.5	2.9/ 8.5	3.1/ 8.3	3.3/ 8.5	3.4/ 8.5
6	3.9	.3/ 5.2	.3/ 5.2	.4/ 5.2	.4/ 5.2	.4/ 5.2	.4/ 5.2	.4/ 5.2	.4/ 5.2	.3/ 4.5	.3/ 4.5	.2/ 5.2	.2/ 5.2	.2/ 5.2
	4.8	.7/ 8.1	.8/ 8.1	.8/ 8.1	.9/ 5.7	1.0/ 5.7	1.0/ 5.2	1.1/ 5.2	1.0/ 5.2	1.0/ 5.2	.9/ 5.2	.9/ 5.7	.8/ 5.7	.8/ 5.7
	5.5	1.1/ 8.3	1.1/ 8.3	1.1/ 8.3	1.1/ 8.3	1.2/ 7.3	1.3/ 5.7	1.4/ 5.7	1.5/ 5.7	1.5/ 5.7	1.6/ 5.7	1.6/ 5.7	1.6/ 5.7	1.6/ 5.7
	6.3	1.6/ 9.0	1.6/ 9.0	1.6/ 9.0	1.6/ 8.7	1.6/ 8.7	1.6/ 6.3	1.8/ 6.3	2.0/ 6.3	2.2/ 6.3	2.4/ 6.3	2.6/ 6.3	2.7/ 6.3	2.8/ 6.3
	7.0	1.8/ 9.2	1.8/ 9.2	1.7/ 9.2	1.7/ 9.2	1.6/ 9.2	1.7/ 8.7	1.8/ 6.7	2.0/ 6.7	2.3/ 6.7	2.5/ 6.7	2.8/ 6.7	2.9/ 6.7	3.0/ 6.7
	7.2	2.0/ 9.5	2.0/ 9.5	2.0/ 9.5	1.9/ 9.5	1.8/ 9.5	1.9/ 9.0	2.0/ 7.1	2.2/ 7.1	2.5/ 7.0	2.8/ 7.0	3.1/ 7.0	3.2/ 7.0	3.3/ 7.0
	7.6	2.1/ 9.8	2.1/ 9.8	2.0/ 9.8	1.9/ 9.8	1.8/ 9.8	1.8/ 9.5	1.9/ 7.7	2.2/ 7.5	2.5/ 7.5	2.7/ 7.5	3.0/ 7.5	3.2/ 7.5	3.2/ 7.5
	8.4	2.5/10.8	2.5/10.8	2.4/10.8	2.2/10.8	2.1/10.5	2.1/10.5	2.2/ 8.5	2.4/ 8.5	2.8/ 8.3	3.1/ 8.3	3.4/ 8.3	3.6/ 8.3	3.6/ 8.3

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 35 - MONOB I, 0, 3, AND 6 KNOT VERTICAL DISPLACEMENTS AT THE CG (HEAVE) FOR SHORT CRESTED JONSWAP SEAS

MONOB I

JONSWAP SHORT CRESTED

RMS VER DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

(AT SIGNIFICANT WAVE HEIGHTS, IN FEET, OF 2.42, 4.64, 5.45, 7.48, 8.30, 9.70, 10.20, 13.13, RESPECTIVELY)

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3.9	.1/ 4.5	.1/ 4.5	.2/ 4.5	.2/ 4.5	.2/ 4.5	.3/ 4.5	.3/ 4.5	.3/ 4.5	.2/ 4.5	.2/ 4.5	.2/ 4.5	.1/ 4.5	.1/ 4.5
	4.8	.4/ 4.8	.4/ 4.8	.6/ 4.8	.7/ 4.8	.9/ 4.8	1.0/ 4.8	1.0/ 4.8	1.0/ 4.8	.9/ 4.8	.8/ 4.8	.6/ 4.8	.5/ 4.8	.4/ 4.8
	5.5	.6/ 5.7	.6/ 5.7	.8/ 5.7	1.0/ 5.2	1.2/ 5.2	1.3/ 5.2	1.3/ 5.2	1.3/ 5.2	1.2/ 5.2	1.0/ 5.2	.9/ 5.2	.7/ 5.7	.6/ 5.7
	6.3	1.0/ 6.3	1.1/ 6.3	1.3/ 6.3	1.5/ 6.3	1.6/ 6.3	1.8/ 6.3	1.8/ 6.3	1.8/ 6.3	1.7/ 6.3	1.5/ 6.3	1.3/ 6.3	1.1/ 6.3	1.1/ 6.3
	7.0	1.3/ 7.0	1.4/ 7.0	1.5/ 7.0	1.7/ 7.0	1.9/ 7.0	2.0/ 7.0	2.0/ 7.0	2.0/ 7.0	1.9/ 7.0	1.7/ 7.0	1.5/ 7.0	1.4/ 7.0	1.4/ 7.0
	7.2	1.7/ 7.3	1.7/ 7.3	1.9/ 7.3	2.0/ 7.3	2.2/ 7.3	2.3/ 7.3	2.4/ 7.3	2.3/ 7.3	2.2/ 7.3	2.1/ 7.3	1.9/ 7.3	1.7/ 7.3	1.7/ 7.3
	7.6	1.9/ 7.9	1.9/ 7.9	2.0/ 7.[illegible]	2.2/ 7.9	2.3/ 7.7	2.4/ 7.7	2.5/ 7.7	2.5/ 7.7	2.4/ 7.7	2.2/ 7.9	2.1/ 7.9	1.9/ 7.9	1.9/ 7.9
	8.4	2.6/ 9.0	2.7/ 9.0	2.8/ 9.0	2.9/ 9.0	3.1/ 9.0	3.2/ 8.5	3.2/ 8.5	3.2/ 8.5	3.1/ 9.0	3.0/ 9.0	2.8/ 9.0	2.7/ 9.0	2.7/ 9.0
3	3.9	.1/ 4.8	.1/ 4.8	.2/ 4.8	.2/ 4.8	.2/ 4.8	.3/ 4.8	.3/ 4.8	.3/ 4.8	.2/ 4.8	.2/ 4.8	.2/ 4.8	.1/ 4.8	.1/ 5.2
	4.8	.3/ 5.7	.4/ 5.2	.6/ 5.2	.7/ 4.8	.9/ 4.8	1.0/ 4.8	1.0/ 4.8	1.0/ 4.8	.9/ 4.8	.8/ 4.8	.6/ 4.8	.5/ 5.2	.4/ 5.2
	5.5	.5/ 6.7	.6/ 6.3	.8/ 5.7	1.0/ 5.7	1.1/ 5.7	1.3/ 5.7	1.3/ 5.7	1.3/ 5.2	1.3/ 5.2	1.1/ 5.7	1.0/ 5.7	.8/ 5.7	.8/ 5.7
	6.3	1.0/ 7.3	1.0/ 7.3	1.2/ 7.1	1.4/ 6.5	1.6/ 6.5	1.7/ 6.3	1.8/ 6.3	1.8/ 6.3	1.8/ 6.3	1.6/ 6.3	1.5/ 6.3	1.4/ 6.3	1.3/ 6.3
	7.0	1.2/ 7.9	1.3/ 7.9	1.4/ 7.9	1.6/ 7.5	1.8/ 7.1	2.0/ 7.0	2.0/ 7.0	2.0/ 7.0	2.0/ 7.0	1.9/ 7.0	1.7/ 7.0	1.6/ 7.0	1.6/ 7.0
	7.2	1.6/ 8.3	1.6/ 8.3	1.8/ 8.3	2.0/ 7.9	2.1/ 7.7	2.3/ 7.5	2.4/ 7.3	2.4/ 7.3	2.3/ 7.3	2.2/ 7.3	2.1/ 7.3	1.9/ 7.3	1.9/ 7.3
	7.6	1.8/ 8.7	1.8/ 8.7	1.9/ 8.7	2.1/ 8.5	2.3/ 8.1	2.4/ 7.9	2.5/ 7.9	2.5/ 7.9	2.5/ 7.9	2.3/ 7.9	2.2/ 7.9	2.1/ 7.9	2.1/ 7.9
	8.4	2.5/ 9.5	2.6/ 9.5	2.7/ 9.5	2.9/ 9.2	3.0/ 9.2	3.2/ 9.0	3.2/ 9.0	3.3/ 9.0	3.2/ 9.0	3.1/ 9.0	3.0/ 9.0	2.9/ 9.0	2.8/ 9.0
6	3.9	.1/ 6.8	.1/ 4.8	.2/ 4.8	.2/ 4.8	.2/ 4.8	.3/ 4.8	.3/ 4.8	.3/ 4.8	.2/ 4.8	.2/ 4.8	.1/ 4.8	.1/ 5.2	.1/ 5.2
	4.8	.3/ 6.3	.4/ 5.7	.5/ 4.8	.7/ 4.8	.8/ 4.8	.9/ 4.8	1.0/ 4.8	1.0/ 4.8	.9/ 4.8	.8/ 4.8	.6/ 4.8	.5/ 5.7	.4/ 5.7
	5.5	.5/ 8.5	.6/ 8.5	.7/ 5.7	.9/ 5.7	1.1/ 5.7	1.3/ 5.7	1.3/ 5.7	1.4/ 5.7	1.3/ 5.7	1.2/ 5.7	1.1/ 5.7	.9/ 5.7	.9/ 5.7
	6.3	.9/ 9.0	1.0/ 9.0	1.1/ 9.0	1.4/ 6.8	1.6/ 6.3	1.8/ 6.3	1.9/ 6.3	2.0/ 6.3	1.9/ 6.3	1.9/ 6.3	1.8/ 6.3	1.7/ 6.3	1.7/ 6.3
	7.0	1.2/ 9.5	1.2/ 9.5	1.4/ 9.2	1.6/ 9.2	1.8/ 7.0	2.0/ 7.0	2.1/ 7.0	2.1/ 7.0	2.1/ 7.0	2.1/ 7.0	2.0/ 7.0	2.0/ 6.7	1.9/ 6.7
	7.2	1.5/ 9.8	1.6/ 9.8	1.7/ 9.8	1.9/ 9.5	2.1/ 7.7	2.3/ 7.5	2.4/ 7.3	2.5/ 7.3	2.5/ 7.3	2.4/ 7.3	2.4/ 7.3	2.3/ 7.1	2.3/ 7.1
	7.6	1.7/10.1	1.8/10.1	1.9/10.1	2.1/ 9.8	2.3/ 8.7	2.4/ 7.9	2.6/ 7.9	2.6/ 7.9	2.6/ 7.9	2.6/ 7.7	2.5/ 7.7	2.4/ 7.7	2.4/ 7.7
	8.4	2.5/10.8	2.5/10.8	2.6/10.8	2.8/10.8	3.0/10.1	3.2/ 9.0	3.3/ 9.0	3.3/ 9.0	3.3/ 9.0	3.3/ 9.0	3.2/ 9.0	3.2/ 9.0	3.1/ 9.0

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 36 - MONOB I, 0, 3, AND 6 KNOT LONGITUDINAL DISPLACEMENTS AT THE CABLE SHEAVE FOR SHORT CRESTED JONSWAP SEAS

MONOB I

JONSWAP SHORT CRESTED

RMS LON DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

(AT SIGNIFICANT WAVE HEIGHTS, IN FEET, OF 2.42, 4.64, 5.45, 7.48, 8.30, 9.70,10.20,13.13, RESPECTIVELY)
CABLE SHEAVE - 39.25 FT AFT OF FP, 18.7 FT TO PORT OF CL, AND 24.9 FT ABOVE BL

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3.9	.0/ 3.9	.0/ 3.9	.0/ 3.9	.0/ 3.9	.0/ 3.9	.0/ 3.9	.0/ 3.9	.0/ 3.9	.0/ 3.9	.0/ 3.9	.0/ 3.9	.0/ 3.9	.0/ 3.9
	4.8	.2/ 5.7	.2/ 5.7	.2/ 5.2	.2/ 5.2	.2/ 5.2	.2/ 4.8	.2/ 4.8	.1/ 4.8	.1/ 4.8	.1/ 5.2	.1/ 5.7	.1/ 5.7	.1/ 5.7
	5.5	.3/ 5.7	.3/ 5.7	.3/ 5.7	.3/ 5.7	.3/ 5.7	.3/ 5.7	.3/ 5.7	.2/ 5.7	.2/ 5.7	.2/ 5.7	.2/ 5.7	.2/ 5.7	.2/ 5.7
	6.3	.7/ 6.5	.7/ 6.5	.7/ 6.5	.7/ 8.3	.7/ 8.3	.7/ 8.3	.6/ 8.5	.6/ 8.5	.5/ 8.5	.5/ 8.5	.5/ 8.5	.5/ 6.3	.5/ 6.3
	7.0	1.0/ 8.3	1.0/ 8.3	1.0/ 8.3	1.0/ 8.3	1.0/ 8.5	1.0/ 8.5	.9/ 8.5	.9/ 8.5	.8/ 8.5	.7/ 8.5	.7/ 9.0	.7/ 9.0	.7/ 9.0
	7.2	1.3/ 8.3	1.3/ 8.3	1.4/ 8.3	1.4/ 8.3	1.4/ 8.3	1.4/ 8.5	1.3/ 8.5	1.2/ 8.5	1.1/ 8.5	1.0/ 8.5	1.0/ 9.0	.9/ 9.0	.9/ 9.0
	7.6	1.7/ 8.3	1.7/ 8.3	1.7/ 8.3	1.8/ 8.3	1.8/ 8.3	1.8/ 8.3	1.7/ 8.5	1.6/ 8.5	1.5/ 8.5	1.4/ 8.5	1.3/ 8.5	1.2/ 9.0	1.2/ 9.0
	8.4	2.4/ 8.5	2.5/ 8.5	2.5/ 8.5	2.7/ 8.5	2.8/ 8.5	2.8/ 8.5	2.8/ 8.5	2.8/ 8.5	2.7/ 9.0	2.5/ 9.0	2.4/ 9.0	2.3/ 9.0	2.2/ 9.0
3	3.9	.1/ 5.2	.1/ 5.2	.1/ 5.2	.1/ 5.2	.1/ 5.2	.1/ 5.2	.1/ 4.8	.0/ 4.2	.0/ 4.2	.0/ 3.9	.0/ 3.9	.0/ 3.9	.0/ 3.9
	4.8	.2/ 7.0	.2/ 6.8	.2/ 6.8	.2/ 6.7	.2/ 5.7	.2/ 5.7	.2/ 5.7	.2/ 5.7	.1/ 5.2	.1/ 5.2	.1/ 5.2	.1/ 5.2	.1/ 5.7
	5.5	.5/ 6.8	.5/ 6.8	.5/ 6.8	.5/ 6.7	.4/ 6.7	.4/ 6.4	.3/ 6.3	.3/ 6.3	.2/ 5.7	.2/ 5.7	.2/ 5.7	.2/ 5.7	.2/ 5.7
	6.3	1.0/ 7.5	1.0/ 7.5	1.0/ 7.5	.9/ 7.5	.9/ 7.5	.8/ 7.3	.7/ 7.1	.5/ 7.0	.4/ 6.8	.4/ 6.5	.4/ 6.5	.4/ 6.3	.4/ 6.3
	7.0	1.4/ 8.3	1.4/ 8.3	1.3/ 8.3	1.3/ 8.3	1.2/ 8.3	1.0/ 8.3	.9/ 8.3	.8/ 8.3	.6/ 8.3	.6/ 7.1	.5/ 7.0	.5/ 7.0	.5/ 7.0
	7.2	1.8/ 8.5	1.8/ 8.5	1.7/ 8.5	1.6/ 8.5	1.5/ 8.3	1.4/ 8.3	1.2/ 8.3	1.0/ 8.3	.9/ 8.3	.8/ 8.5	.7/ 7.5	.7/ 7.3	.7/ 7.3
	7.6	1.9/ 8.5	1.9/ 8.5	1.8/ 8.5	1.8/ 8.5	1.7/ 8.5	1.6/ 8.5	1.4/ 8.5	1.2/ 8.5	1.1/ 8.3	1.0/ 8.3	.9/ 9.5	.9/ 9.5	.9/ 9.5
	8.4	2.1/ 8.5	2.1/ 8.5	2.1/ 8.5	2.1/ 8.5	2.1/ 8.5	2.0/ 8.7	2.0/ 8.7	1.9/ 9.0	1.8/ 9.0	1.7/ 9.0	1.6/ 9.0	1.6/ 9.5	1.5/ 9.5
6	3.9	.1/ 7.7	.1/ 7.7	.1/ 7.7	.1/ 6.8	.1/ 6.8	.1/ 6.8	.1/ 6.8	.1/ 6.8	.0/ 5.7	.0/ 3.9	.0/ 3.9	.0/ 3.9	.0/ 3.9
	4.8	.5/ 8.5	.5/ 8.5	.4/ 8.5	.4/ 8.5	.4/ 8.3	.3/ 8.3	.3/ 7.7	.2/ 6.8	.1/ 6.3	.1/ 6.3	.1/ 5.2	.1/ 5.7	.1/ 5.7
	5.5	.9/ 8.5	.8/ 8.5	.8/ 8.5	.7/ 8.5	.7/ 8.5	.6/ 8.3	.4/ 8.1	.3/ 7.3	.2/ 7.3	.2/ 6.7	.2/ 5.7	.2/ 5.7	.2/ 5.7
	6.3	1.4/ 8.5	1.4/ 8.5	1.3/ 8.5	1.2/ 8.5	1.1/ 8.5	1.0/ 8.5	.8/ 8.3	.6/ 8.3	.4/ 8.1	.3/ 6.7	.3/ 6.3	.3/ 6.3	.3/ 6.3
	7.0	1.5/ 8.5	1.5/ 8.5	1.5/ 8.5	1.4/ 8.5	1.3/ 8.5	1.1/ 8.5	.9/ 8.5	.7/ 8.3	.6/ 8.3	.5/ 8.1	.4/ 7.0	.4/ 7.0	.4/ 7.0
	7.2	1.8/ 8.5	1.7/ 8.5	1.7/ 8.5	1.6/ 8.5	1.4/ 8.5	1.3/ 8.5	1.1/ 8.5	.9/ 8.5	.7/ 8.3	.6/ 8.1	.6/ 7.5	.6/ 7.3	.6/ 7.3
	7.6	1.8/10.1	1.8/10.1	1.8/ 8.5	1.6/ 8.5	1.5/ 8.5	1.3/ 8.5	1.1/ 8.5	1.0/ 8.5	.8/ 8.5	.7/ 8.3	.7/ 7.9	.7/ 7.9	.7/ 7.9
	8.4	2.5/10.8	2.4/10.8	2.3/10.8	2.1/10.8	1.9/ 8.5	1.7/ 8.7	1.5/ 8.7	1.4/ 9.0	1.3/ 9.0	1.2/ 9.0	1.1/ 9.0	1.1/ 9.0	1.1/10.5

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 37 - MONOB I, 0, 3, AND 6 KNOT LATERAL DISPLACEMENTS AT THE CABLE SHEAVE FOR SHORT CRESTED JONSWAP SEAS

RMS LAT DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

(AT SIGNIFICANT WAVE HEIGHTS, IN FEET, OF 2.42, 4.64, 5.45, 7.48, 8.30, 9.70, 10.20, 13.13, RESPECTIVELY)
CABLE SHEAVE - 39.25 FT AFT OF FP, 18.7 FT TO PORT OF CL, AND 24.9 FT ABOVE BL

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3.9	.1/ 3.9	.1/ 3.9	.1/ 3.9	.2/ 3.9	.2/ 3.9	.2/ 3.9	.2/ 3.9	.2/ 3.9	.2/ 3.9	.2/ 3.9	.1/ 3.9	.1/ 3.9	.1/ 3.9
	4.8	.3/ 4.8	.3/ 4.8	.4/ 4.8	.5/ 4.8	.5/ 4.8	.6/ 4.8	.6/ 4.8	.6/ 4.8	.5/ 4.8	.5/ 4.8	.4/ 4.8	.3/ 4.8	.3/ 4.8
	5.5	.5/ 5.7	.5/ 5.7	.6/ 5.7	.7/ 5.7	.8/ 5.7	.9/ 5.7	.9/ 5.7	.8/ 5.7	.8/ 5.7	.7/ 5.7	.6/ 5.7	.5/ 5.7	.4/ 5.7
	6.3	.9/ 6.3	.9/ 6.3	1.1/ 6.3	1.2/ 6.3	1.4/ 6.3	1.5/ 6.3	1.5/ 6.3	1.4/ 6.3	1.3/ 6.3	1.2/ 6.3	1.0/ 6.3	.9/ 6.3	.8/ 6.3
	7.0	1.2/ 8.3	1.2/ 7.0	1.4/ 7.0	1.6/ 7.0	1.8/ 7.0	1.9/ 7.0	1.9/ 7.0	1.8/ 7.0	1.7/ 7.0	1.5/ 7.0	1.3/ 7.0	1.1/ 7.0	1.1/ 7.0
	7.2	1.5/ 8.3	1.6/ 8.3	1.8/ 8.3	2.1/ 8.3	2.3/ 7.5	2.4/ 7.5	2.4/ 7.5	2.3/ 7.5	2.2/ 7.5	1.9/ 7.5	1.7/ 7.5	1.5/ 8.3	1.4/ 8.3
	7.6	1.9/ 8.3	2.0/ 8.3	2.2/ 8.3	2.5/ 8.3	2.7/ 8.3	2.8/ 8.3	2.8/ 8.3	2.7/ 8.3	2.5/ 8.3	2.3/ 8.3	2.0/ 8.3	1.7/ 8.3	1.6/ 8.3
	8.4	2.7/ 8.5	2.8/ 8.5	3.1/ 8.5	3.4/ 8.5	3.7/ 8.5	3.8/ 8.5	3.8/ 8.5	3.7/ 8.5	3.4/ 8.5	3.0/ 8.5	2.7/ 8.5	2.4/ 8.5	2.3/ 8.5
3	3.9	.1/ 5.2	.1/ 4.5	.2/ 4.5	.2/ 4.2	.2/ 4.2	.2/ 4.2	.2/ 4.2	.2/ 4.2	.2/ 4.2	.2/ 3.9	.1/ 3.9	.1/ 3.9	.1/ 3.9
	4.8	.4/ 5.7	.4/ 5.7	.5/ 5.7	.5/ 5.2	.6/ 5.2	.6/ 5.2	.6/ 5.2	.6/ 4.8	.5/ 4.8	.4/ 4.8	.3/ 4.8	.3/ 4.8	.2/ 4.8
	5.5	.6/ 6.4	.6/ 6.4	.7/ 6.3	.8/ 6.3	.9/ 5.7	.9/ 5.7	.9/ 5.7	.8/ 5.7	.7/ 5.7	.6/ 5.7	.5/ 5.7	.4/ 5.7	.4/ 5.7
	6.3	1.1/ 7.3	1.1/ 7.3	1.3/ 7.1	1.4/ 7.0	1.5/ 6.8	1.5/ 6.8	1.5/ 6.5	1.4/ 6.5	1.2/ 6.5	1.1/ 6.3	.9/ 6.3	.7/ 6.3	.7/ 6.3
	7.0	1.5/ 8.3	1.5/ 8.3	1.6/ 8.3	1.8/ 7.9	1.9/ 7.7	1.9/ 7.5	1.9/ 7.3	1.7/ 7.1	1.5/ 7.0	1.3/ 7.0	1.1/ 7.0	.9/ 7.0	.8/ 7.0
	7.2	1.9/ 8.5	1.9/ 8.5	2.1/ 8.5	2.2/ 8.3	2.4/ 8.3	2.4/ 8.1	2.3/ 7.9	2.1/ 7.7	1.9/ 7.5	1.6/ 7.5	1.3/ 7.3	1.1/ 7.3	1.0/ 7.3
	7.6	2.0/ 8.5	2.1/ 8.5	2.3/ 8.5	2.4/ 8.5	2.6/ 8.5	2.6/ 8.3	2.6/ 8.3	2.4/ 8.1	2.1/ 8.1	1.8/ 7.9	1.5/ 7.9	1.3/ 7.9	1.2/ 7.9
	8.4	2.1/ 8.7	2.2/ 8.5	2.5/ 8.5	2.8/ 8.5	3.0/ 8.5	3.1/ 8.5	3.1/ 8.5	3.0/ 8.5	2.7/ 8.5	2.4/ 8.5	2.0/ 8.5	1.7/ 9.0	1.6/ 9.0
6	3.9	.2/ 6.8	.2/ 6.8	.2/ 6.8	.2/ 6.8	.2/ 5.2	.2/ 4.5	.2/ 4.5	.2/ 4.5	.2/ 4.5	.1/ 4.5	.1/ 3.9	.1/ 3.9	.1/ 3.9
	4.8	.6/ 8.5	.6/ 8.5	.6/ 8.5	.7/ 8.5	.7/ 6.8	.7/ 6.3	.7/ 5.7	.6/ 5.2	.5/ 4.8	.4/ 4.8	.3/ 4.8	.2/ 4.8	.2/ 4.8
	5.5	1.0/ 8.5	1.0/ 8.5	1.0/ 8.5	1.0/ 8.5	1.1/ 8.5	1.0/ 7.3	1.0/ 6.7	.9/ 5.7	.7/ 5.7	.6/ 5.7	.5/ 5.7	.4/ 5.7	.3/ 5.7
	6.3	1.6/ 8.5	1.6/ 8.5	1.7/ 8.5	1.7/ 8.5	1.8/ 8.5	1.7/ 8.5	1.6/ 8.3	1.4/ 6.8	1.2/ 6.5	1.0/ 6.3	.8/ 6.3	.6/ 6.3	.6/ 6.3
	7.0	1.7/ 8.7	1.7/ 8.7	1.8/ 8.5	2.0/ 8.5	2.0/ 8.5	2.0/ 8.5	1.9/ 8.3	1.7/ 8.1	1.5/ 7.0	1.2/ 7.0	1.0/ 7.0	.8/ 7.0	.7/ 7.0
	7.2	1.9/ 8.7	1.9/ 8.7	2.1/ 8.5	2.2/ 8.5	2.3/ 8.5	2.3/ 8.5	2.2/ 8.3	2.0/ 8.1	1.8/ 7.5	1.5/ 7.5	1.2/ 7.3	1.0/ 7.3	.9/ 7.3
	7.6	1.8/ 8.7	1.9/ 8.7	2.0/ 8.7	2.2/ 8.5	2.3/ 8.5	2.4/ 8.5	2.3/ 8.3	2.1/ 8.1	1.9/ 7.9	1.6/ 7.9	1.3/ 7.9	1.1/ 7.9	1.0/ 7.9
	8.4	2.0/ 8.7	2.1/ 8.7	2.3/ 8.7	2.5/ 8.7	2.7/ 8.5	2.8/ 8.5	2.8/ 8.5	2.6/ 8.5	2.4/ 8.5	2.1/ 8.5	1.8/ 8.5	1.5/ 9.0	1.4/ 9.0

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

TABLE 38 - MONOB I, 0, 3, AND 6 KNOT VERTICAL DISPLACEMENTS AT THE CABLE SHEAVE FOR SHORT CRESTED JONSWAP SEAS

MONOB I

JONSWAP SHORT CRESTED
RMS VER DISP IN FEET/ENCOUNTERED MODAL PERIOD, T_{OE}, IN SECONDS

(AT SIGNIFICANT WAVE HEIGHTS, IN FEET, OF 2.42, 4.64, 5.45, 7.48, 8.30, 9.70, 10.20, 13.13, RESPECTIVELY)
CABLE SHEAVE - 39.25 FT AFT OF FP, 18.7 FT TO PORT OF CL, AND 24.9 FT ABOVE BL

V	T_0	SHIP HEADING ANGLE IN DEGREES 0	15	30	45	60	75	90	105	120	135	150	165	180
0	3.9	.3/ 4.5	.3/ 4.5	.3/ 4.5	.4/ 4.5	.4/ 4.5	.4/ 4.5	.4/ 4.5	.4/ 4.5	.4/ 4.5	.3/ 4.5	.3/ 4.5	.3/ 4.8	.2/ 4.8
	4.8	1.0/ 4.8	1.0/ 4.8	1.1/ 4.8	1.2/ 4.8	1.3/ 4.8	1.4/ 4.8	1.4/ 4.8	1.4/ 4.8	1.3/ 4.8	1.2/ 4.8	1.0/ 4.8	.9/ 4.8	.9/ 4.8
	5.5	1.3/ 5.7	1.4/ 5.2	1.5/ 5.2	1.6/ 5.2	1.7/ 5.2	1.7/ 5.2	1.8/ 5.2	1.8/ 5.2	1.7/ 5.2	1.6/ 5.2	1.5/ 5.7	1.4/ 5.7	1.3/ 5.7
	6.3	2.0/ 6.3	2.0/ 6.3	2.1/ 6.3	2.2/ 6.3	2.3/ 6.3	2.4/ 6.3	2.5/ 6.3	2.5/ 6.3	2.4/ 6.3	2.4/ 6.3	2.3/ 6.3	2.2/ 6.3	2.2/ 6.3
	7.0	2.3/ 7.0	2.3/ 7.0	2.4/ 7.0	2.5/ 7.0	2.7/ 7.0	2.8/ 7.0	2.9/ 7.0	2.9/ 7.0	2.9/ 7.0	2.8/ 7.0	2.7/ 7.0	2.6/ 7.0	2.6/ 7.0
	7.2	2.7/ 7.1	2.8/ 7.3	2.9/ 7.3	3.1/ 7.3	3.3/ 8.5	3.4/ 8.5	3.5/ 8.3	3.6/ 8.3	3.5/ 7.3	3.4/ 7.3	3.3/ 7.3	3.2/ 7.3	3.2/ 7.3
	7.6	3.0/ 8.5	3.1/ 8.5	3.3/ 8.5	3.5/ 8.5	3.7/ 8.5	3.9/ 8.3	4.1/ 8.3	4.1/ 8.3	4.1/ 8.3	3.9/ 8.3	3.8/ 8.3	3.7/ 8.3	3.6/ 8.3
	8.4	4.5/ 9.0	4.6/ 9.0	4.9/ 9.0	5.2/ 8.5	5.6/ 8.5	5.9/ 8.5	6.0/ 8.5	6.0/ 8.5	5.8/ 8.5	5.6/ 8.5	5.3/ 8.5	5.0/ 8.5	5.0/ 8.5
3	3.9	.3/ 4.8	.3/ 4.8	.4/ 4.8	.4/ 4.5	.5/ 4.5	.5/ 4.5	.5/ 4.5	.4/ 4.5	.4/ 4.5	.3/ 4.8	.2/ 4.8	.2/ 5.2	.2/ 5.2
	4.8	.7/ 5.7	.8/ 5.7	.9/ 5.2	1.1/ 5.2	1.2/ 4.8	1.3/ 4.8	1.4/ 4.8	1.4/ 4.8	1.3/ 4.8	1.2/ 4.8	1.0/ 4.8	.9/ 5.2	.8/ 5.2
	5.5	1.0/ 6.5	1.1/ 6.5	1.2/ 6.4	1.4/ 5.7	1.5/ 5.7	1.7/ 5.7	1.8/ 5.2	1.8/ 5.2	1.8/ 5.2	1.7/ 5.2	1.6/ 5.7	1.5/ 5.7	1.4/ 5.7
	6.3	1.7/ 7.3	1.7/ 7.3	1.8/ 7.1	2.0/ 7.0	2.2/ 6.5	2.3/ 6.3	2.5/ 6.3	2.5/ 6.3	2.5/ 6.3	2.4/ 6.3	2.3/ 6.3	2.3/ 6.3	2.2/ 6.3
	7.0	2.2/ 8.7	2.2/ 8.7	2.3/ 8.5	2.5/ 8.5	2.6/ 8.5	2.7/ 7.1	2.8/ 7.0	2.9/ 7.0	2.8/ 7.0	2.8/ 7.0	2.7/ 7.0	2.6/ 7.0	2.6/ 7.0
	7.2	2.9/ 8.7	2.9/ 8.7	3.0/ 8.7	3.2/ 8.5	3.3/ 8.5	3.4/ 8.5	3.5/ 8.5	3.5/ 7.5	3.4/ 7.3	3.3/ 7.3	3.2/ 7.3	3.1/ 7.3	3.1/ 7.3
	7.6	3.4/ 8.7	3.4/ 8.7	3.5/ 8.7	3.7/ 8.7	3.8/ 8.7	3.9/ 8.5	3.9/ 8.5	3.9/ 8.3	3.7/ 7.9	3.6/ 7.9	3.4/ 7.9	3.3/ 7.9	3.3/ 7.9
	8.4	4.4/ 9.0	4.4/ 9.0	4.6/ 9.0	4.9/ 9.0	5.2/ 9.0	5.3/ 9.0	5.4/ 9.0	5.3/ 9.0	5.2/ 9.0	4.9/ 9.0	4.7/ 9.0	4.5/ 9.0	4.5/ 9.0
6	3.9	.2/ 6.8	.2/ 5.2	.3/ 5.2	.4/ 5.2	.4/ 4.8	.4/ 4.8	.4/ 4.8	.4/ 4.8	.3/ 4.8	.3/ 4.8	.2/ 4.8	.2/ 5.2	.1/ 5.2
	4.8	.6/ 8.7	.7/ 8.7	.8/ 8.7	1.0/ 4.8	1.2/ 4.8	1.3/ 4.8	1.3/ 4.8	1.3/ 4.8	1.2/ 4.8	1.1/ 4.8	1.0/ 5.2	.8/ 5.7	.8/ 5.7
	5.5	1.0/ 8.7	1.1/ 8.7	1.2/ 8.7	1.4/ 8.7	1.5/ 5.2	1.7/ 5.2	1.8/ 5.7	1.9/ 5.7	1.8/ 5.7	1.8/ 5.7	1.6/ 5.7	1.5/ 5.7	1.5/ 5.7
	6.3	2.1/ 8.7	2.1/ 8.7	2.2/ 8.7	2.3/ 8.7	2.4/ 8.7	2.5/ 8.7	2.6/ 6.3	2.6/ 6.3	2.7/ 6.3	2.6/ 6.3	2.6/ 6.3	2.5/ 6.3	2.5/ 6.3
	7.0	2.6/ 9.0	2.6/ 9.0	2.6/ 8.7	2.7/ 8.7	2.9/ 8.7	2.9/ 8.7	3.0/ 8.7	3.0/ 7.0	3.0/ 7.0	2.9/ 7.0	2.9/ 7.0	2.8/ 7.0	2.8/ 6.7
	7.2	3.0/ 9.0	3.1/ 9.0	3.2/ 9.0	3.3/ 8.7	3.4/ 8.7	3.5/ 8.7	3.6/ 8.7	3.5/ 7.3	3.5/ 7.3	3.4/ 7.3	3.3/ 7.3	3.3/ 7.1	3.3/ 7.1
	7.6	3.2/ 9.0	3.2/ 9.0	3.4/ 9.0	3.5/ 9.0	3.7/ 8.7	3.8/ 8.7	3.8/ 8.7	3.8/ 8.5	3.7/ 7.9	3.6/ 7.9	3.5/ 7.9	3.4/ 7.7	3.4/ 7.7
	8.4	3.9/10.8	4.0/10.5	4.2/ 9.0	4.4/ 9.0	4.7/ 9.0	4.9/ 9.0	5.0/ 9.0	5.0/ 9.0	4.9/ 9.0	4.7/ 9.0	4.6/ 9.0	4.5/ 9.0	4.4/ 9.0

NOTE: V IS SHIP SPEED IN KNOTS AND T_0 IS MODAL WAVE PERIOD IN SECONDS. 1 FOOT = 0.305 METRES

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